The United States MILLER

Volume 9.—No. 3. MILWAUKEE, JULY, 1880. Terms: $1.00 a Year in Advance. Single Copies, 10 Cents.

The United States MILLER

Volume 9.—No. 3. MILWAUKEE, JULY, 1880. Terms: $1.00 a Year in Advance. Single Copies, 10 Cents.

List of Premiums Awarded at the Exhibition.

Best Patent Flour from Spring Wheat—Washburn, Crosby & Co., Minneapolis, "Superlative," gold medal; same firm, "Extra," silver medal; same firm, "Parisian," bronze medal.

Best Straight Flour from Spring Wheat—Leonard, Day & Co., Minneapolis, "Palisade," gold medal; Washburn, Crosby & Co., "Derby," silver medal; Iron Mountain Mills, St. Louis, "Harvest Home," bronze medal.

Best Clear Flour from Spring Wheat—Hinkle Bros., Minneapolis, Minn., "Inland," gold medal.

Best Patent Flour from Winter Wheat—John C. Boyle, Sparta, Ill., "Early Riser," gold medal; John Huegley, Nashville, Ill., "Huegley's Best," silver medal; Waggoner & Gates, Independence, Mo., "Queen of the Pantry," bronze medal.

Best Straight Flour from Winter Wheat—Atlantic Milling Company, St. Louis, Mo., "Bain's Choice," gold medal; James Gordon & Co., Sparta, Ill., "Red Sea," silver medal; A. A. Taylor, Londonville, Ohio, "Taylor's Fancy," bronze medal.

Best Hominy Mill—To Coomb & Gray, Memphis, Ind., diploma of merit.

Best Mill Picks—Richmond City Mill Works, first premium.

Best Bag Holder—Skillin & Mosher, Chicago, first premium.

Best Attachment to Prevent Clogging of Bolting Cloth—Rathbun Bros., Rochester, N. Y., first premium.

Best Display of Wire Cloth—Howard & Morse, New York City, first premium.

Best Emery or Corundum Hand Tool—Horace M. Deal, Bucyrus, O., first premium.

Best Mixing and Sifting Machine—M. Martin, Bitterfield, Prussia, first premium.

Best Proof Staff—Marshall, Graves & Co., Dayton, O., first premium.

Best Millstone Dressing Machine (power)—N. Copelin, Cannon Falls, Minn., first premium.

Three Rivers Manufacturing Co., diploma of merit.

Best Automatic Grain Scales—Simpson & Gault.

Best Smut Machine, Brush Machine, Separator and Grader—Barnard & Lea's Manufacturing Co.

Best Millstone Dressing Machine (hand)—Chas. Bowers & Co., Youngstown, O., first premium.

John James, La Crosse, Wis.; Griscom & Co., Thos. McFeeley, premium No. 57.

Best Barrel Tally—W. N. Durant, Milwaukee, Wis., diploma of merit.

Best Conveyor—H. W. Caldwell, St. Louis, Mo., diploma of merit.

Best Elevator Bucket—W. J. Clark, Salem, O., first premium No. 59.

The Everlasting Bucket Co., of Terre Haute, Ind., diploma of merit.

Best Millstone Feeder—Fred. Klinkerman, Aurora, Ind., diploma of merit.

Best Bran Dresser—E. P. Allis & Co., Milwaukee.

Best Smooth Roller Mill., Ganz & Co., Budapest, Hungary.

Best Corrugated and Portable Roller Mills—E. P. Allis & Co., Milwaukee.

Best Bolting Cloth—Dufour & Co., Thal, Switzerland.

Best Middlings Purifier—George T. Smith. Purifier, Co.

Best Flour Packer—Barnard & Leas, Manufacturing Co., Moline, Ill.

Best Buhr Millstones—Simpson & Gault, Cincinnati.

Best Display Milling Machinery—Simpson & Gault.

Best Corn Sheller—Union Iron Works, Decatur, Ill.

Best Complete Mill Job—Simpson & Gault.

Best Self-Tramming, Driving and Balance Iron for Millstones—W. H. Dickey, Jackson, Mich.

Best Bolting Chest—Simpson & Gault.

Best Scourer and Feeder—J. N. Knox, Evansville, Ind.

Best Backlash Spring—John Hafner, Pittsburg.

Best Millstone Ventilator—Geo. T. Smith, Middlings Purifier Co., Jackson, Mich.

Best Wheat Heater—A. B. Bowman, St. Louis, Mo.

Best Cockle Separator—Cockle Separating Company, Milwaukee.

Best Flour Made in the Exhibition—Nordyke & Marmon Co., Indianapolis, Ind.

Best Flax Bagging—None.

Best Cotton Bagging—Bemis Bro. & Co., St. Louis.

Best Hemp Bagging—None.

Best Jute Bagging—H. & L. Chase, St. Louis.

Best Mixed Bagging—H. & L. Chase, St. Louis.

Best Display Satchel-bottomed Flour Bags—Chatfield & Woods, Cincinnati, Ohio. Honorable mention of Godfrey & Clark, Pittsburg; Raymond Bag Co., Cincinnati.

Best Display of Jute Bags—C. W. Biglow & Co., New York.

Best Display of Cotton Bags—Bemis Bro. & Co., St. Louis.

Best Sample Envelope—Marer Mail Packet Company, Chicago, Ill.

Best Imported Paper Flour Sack—Arkell & Smiths, Canajoharie, N. Y.

Best Cotton Flour Bags—Bemis Bro. & Co., St. Louis.

Best Export Sacks—A. Best Cotton Export Bag—Bemis Bro. & Co. B. Best Jute Export Bag—C. W. Biglow & Co.

Regarding the best display of grain, the jurors reported as follows:

CINCINNATI, June 10, 1880.

We, the undersigned, appointed by the Millers' National Association to award the premium for the best grain and agricultural display by any State or railroad company, beg leave to report that we have examined the several exhibits, and award the first premium to the Missouri Millers' State Association, with a very honorable mention of the exhibition by the Iowa Millers' State Association.

J. J. VAN DEN WYNGAERT,
WM. H. BREWER,
JOS. KRATOCHWILL.

Our Book Department.

For the convenience of our readers, we have made arrangements with publishess so that we can furnish any of the following works, postpaid, on receipt of price. All remittances must be made by post-office money order, draft on New York or Chicago, or by registered letter. For sums of less than $1 postage stamps will be taken. Address all orders to

E. HARRISON CAWKER,
Publisher United States Miller,
Milwaukee, Wis.

CRAIK.—*The Practical American Millwright and Miller.* By DAVID CRAIK, Millwright. Illustrated by numerous wood engravings. and two folding plates. 8vo, $5.

CONTENTS.—Part I. Introduction—Chapter I. Mechanical Powers, The Lever, The Inclined Plane, The Wedge, The Screw, The Pulley and Cord, The Crank. II. Fly and Balance Wheels. Centrifugal Force and Circular Motion, Action and Reaction, Friction. III. Transmission and Transportation of Motive Power. IV. Peculiarities and Properties of Pressure of Water, Taking Levels, Fitting Down Sills Under Water, Pressure of Water, Velocity of Falling Water, Tables of Velocity of Water and Quantity Discharged, Measuring a Stream of Water, Table of the Quantity of Water Passing Over a Wier. Part II. Water Wheels. V. The Undershot. VI. The Overshot. VII. Experiments with Wheels, Barker's Wheel. VIII. Central Discharge Wheels. IX. Spiral Discharge Wheels, The Rose Wheel. X. Spiral Screw or Flood Wheels. XI. Mill-Dams. Part III.—Saw Mills. XII. The English Gate. XIII. The Mulley Saw. XIV. The Gang. XV. The Circular Saw-Mill, The Edging Circular, Table of Logs Reduced to Inch-board Measure. Part IV. Grist Mills. XVI. Planning, Gearing, Belt Gearing, Gearing Overshots, The Building, The Husk Timbers, etc., The Bridge Trees, The Step, The Spindle, The Bed-Stone, The Driver, The Damsil, The Boxes, The Bushes, The Curb, The Hopper, Shoes, Mill Stones, Burr Stones, Truing the Stones, Draught, Dressing the Stones, The Quarter Dress, The Sickle Dress, Balancing the Runner. Bolts, Bolt Chests, Bolt Cloth, Smut Machines, Screens, Merchant or Manufacturing Bolts. Part V.—XVII. The Oatmeal Mill, The Kiln, The Process of Drying, Dressing, and Hanging the Stones, Manufacture of Split Peas. XVIII. The Barley Mill. XIX. Wool Carding and Cloth Fulling and Dressing, The Tenter Bars, The Shearing Machine, The Cloth Press. XX. Windmills. XXI. Steam Power. Index.

HUGHES.—*American Miller and Millwright's Assistant.* By WM. CARTER HUGHES. A new edition. In one volume, 12mo. $1.50.

Among the Contents will be found the following: Introduction—Explanation of Technical Words. Part I. On the First Principles of Mechanics.—Table of the Surfaces of Contacts without Unguents—Tables of the Results of Experiments on Friction, with Unguents, by M. Morin—Table of Diameters of First Movers—Table of Diameters and Circumferences of Circles, Areas, and Side of Equal Squares—Geometrical Definitions of the Circle and its Parts—Centre of Percussion and Oscillation. Hydrostatics: Introduction—On the Upward and Downward Pressure of Water—Specific Gravity—Table of Specific Gravities—Hydrodynamic Power of Water-wheels—On the Action and Reaction of Water, as applied to Water-wheels—On the Construction of the Combination Reaction Water-wheel—Table of Velocities of Water-wheels per minute, with Heads of from four to thirty feet—Table of the Number of Inches of Water Necessary to Drive one Run of Stone for Grist or Saw-mills on Heads of four to thirty feet—Table showing the Required Length of Overshot and Breast-wheels on Heads of ten to thirty feet—Table showing the Velocity of Water. Part II.—Practical Milling and Millwrighting.

PALLETT.—*The Miller's, Millwright's and Engineer's Guide.* By HENRY PALLETT. Illustrated. In one vol. 12mo., $3.

LEFFEL.—*The Construction of Mill-Dams:* Comprising also the building of Race and Reservoir Embankments and Head Gates, the measurement of streams, gauging of water supply, etc. By JAMES LEFFEL & Co. Illustrated by 58 engravings. 1 vol. 8vo., $2.50.

LARDNER.—*The Steam Engine:* For the use of Beginners. By Dr. LARDNER. Illustrated. 12mo, 75 cents.

TEMPLETON.—*The Practical Examinator on Steam and the Steam Engine:* With Instructive References relative thereto, arranged for the use of Engineers, Students, and others. By WM. TEMPLETON, Engineer. 12mo, $1.25.

BOURNE.—*Recent Improvements in the Steam Engine:* In its various applications to Mines, Mills, Steam Navigation, Railways, and Agriculture. Being a supplement to the "Catechism of the Steam Engine." By JOHN BOURNE, C. E. New Edition. With numerous Illustrations. 16mo. Cloth, $1.50.

BYRNE.—*Handbook for the Artisan, Mechanic and Engineer:* Comprising the Grinding and Sharpening of Cutting Tools, Abrasive Processes, Lapidary Work, Gem and Glass Engraving, Varnishing and Lacquering, Apparatus, Moterials and Processes for Grinding and Polishing, etc. By OLIVER BYRNE. Illustrated by 185 wood engravings. One vol. 8vo., $5.

EDWARDS.—*A Catechism of the Marine Steam Engine,* For the use of Engineers, Firemen and Mechanics. A Practical Work for Practical Men. By EMORY EDWARDS, Mechanical Engineer. Illustrated by 60 engravings, including examples of the most modern Engines. In one volume, 12mo, $2.

WATSON.—*The Modern Practice of American Machinists and Engineers:* Including the Construction, Application and Use of Drills, Lathe Tools, Cutters for Boring Cylinders and Hollow Work Generally, with the most Economical Speed for the same; the Results Verified by Actual Practice at the Lathe, the Vice, and on the Floor, together with Workshop Management, Economy of Manufacture, the Steam Engine, Boilers, Gears, Belting, etc., etc. By EGBERT P. WATSON, late of the "Scientific American." Illustrated by 86 engravings. In one volume, 12mo, $2.50.

LUKIN.—*The Young Mechanic.* Practical carpentry, containing directions for the use of all kinds of tools, and for construction of steam engines and mechanical models, including the art of turning in wood and metal. By JOHN LUKIN, author of "The Lathe and Its Uses," etc. Illustrated. 12mo, $1.75.

LUKIN.—*Amongst Machines:* Embracing descriptions of the various mechanical appliances used in the manufacture of wood, metal, and other substances. 12mo, $1.75.

LUKIN.—*The Boy Engineers:* What They Did, and How They Did It. With 30 plates. 12mo, $1.75.

WILSON.—*A Treatise on Steam Boilers:* Their Strength, Construction and Economical Working. By ROBERT WILSON. Illustrated. 12mo, $2.50.

CONTENTS.—Chapter I. Introductory. II. Strength of Cylinder, Sphere and Flat Surfaces. III. Properties and Character of Boiler Materials. IV. Riveting. V. Welding. VI. Construction of Boilers. VII. Boiler Mountings and Setting. VIII. Incrustation. IX. Wear and Tear. X. Factor of Safety. XI. Testing. XII. Boiler Explosions. XIII. Combustion of Coal. XIV. Smoke Prevention and Firing. XV. Heating Surface. XVI. Boiler Power. XVII. Bursting and Collapsing Pressures of Cylinders.

ROBINSON.—*Explosions of Steam Boilers:* How they are Caused, and How They May be Prevented. By J. R. ROBINSON, Steam Engineer. 12mo, $1.25.

CONTENTS.—Explosions Caused by Low Water, by Over-Pressure, by Defects in Materials, etc.; by Scale or Sediment, by Repulsion of the Water; by Overheating of the water; How Explosions Caused by Low Water, by Over-pressure, by Defective Materials, etc.; by Scale and Sediment, by Repulsion of the Water, by Overheating of the Water, May be Prevented.

NYSTROM.—*A New Treatise on Elements of Mechanics:* Establishing Strict Precision in the Meaning of Dynamical Terms: accompanied with an Appendix on Duodenal Arithmetic and Metrology. By JOHN W. NYSTROM, C. E. Illustrated, 8vo, $4.

MOLESWORTH.—*Pocket-Book of Useful Formulæ and Memoranda for Civil and Mechanical Engineers.* By GUILFORD L. MOLESWORTH, Member of the Institution of Civil Engineers, Chief Resident Engineer of the Ceylon Railway. Second American, from the Tenth London Edition. In one volume, full-bound in pocket-book form, $2.

ROPP'S COMMERCIAL CALCUCATOR: Containing many convenient and valuable Tables, showing the value of Wheat, Corn, Rye, Oats, Barley, Cattle, Hogs, Hay, Coal, Lumber, Merchandise; the simple and compound interest at 6, 7, 8 and 10 per cent.; Measurement of Boards, Scantlings, Timber, Saw Logs. Cisterns, Tanks, Granaries, Corn-Cribs, Wagon-Beds, Time Table, Wages Table, etc., etc., etc.; also entirely New and Practical Method of Rapid Calculation. By CHRISTIAN ROPP, Jr. Pocket-book form, cloth, $1.

McLEAN.—*The Miller's Text-Book.* By JAMES McLEAN, of Glasgow, Scotland. Price, postpaid, 60 cents.

Any other books, either domestic or foreign, that our readers may desire, we shall be pleased to obtain and furnish to them at the lowest rates, postpaid, to any part of the United States or Canada.

Cements for the Shop.

Iron Cement for Closing the Joints of Iron Pipes.—Take of coarsely powdered iron borings, five pounds; powdered sal-ammoniac, two ounces; sulphur, one ounce; and water sufficient to moisten it. This composition hardens rapidly; but if time can be allowed it sets more firmly without the sulphur. It must be used as soon as mixed and rammed tightly into the joint.

2. Take sal-ammoniac, two ounces; sublimed sulphur, one ounce; cast iron filings or fine turnings, one pound. Mix in a mortar and keep the powder dry. When it is to be used, mix it with twenty times its weight of clean iron turnings or filings, and grind the whole in a mortar; then wet it with water until it becomes of convenient consistence, when it is to be applied to the joint. After a time it becomes as hard and strong as any part of the metal.

Cement for Uniting Leather and Metal.—Wash the metal with hot gelatine; steep the leather in an infusion of nutgalls (hot) and bring the two together.

Cement for Leather Belting.—One who has tried everything says that after an experience of 15 years he has found nothing to equal the following: Common glue and isinglass, equal parts, soaked for ten hours in just enough water to cover them. Bring gradually to a boiling heat and add pure tannin until the whole becomes ropy or appears like the white of an egg. Buff off the surfaces to be joined, apply this cement warm and clamp firmly.

Steam-Boiler Cement.—Mix two parts of finely powdered litharge with one part of very fine sand, and one part of quicklime which has been allowed to slake spontaneously by exposure to the air. This mixture may be kept for any length of time without injuring. In using it a portion is mixed into paste with linseed oil, or, still better, boiled linseed oil. In this state it must be quickly applied, as it soon becomes hard.

Turner Cement.—Melt one pound of resin in a pan over the fire, and, when melted, add one-quarter of a pound of pitch. While these are boiling, add brick-dust until by dropping a little on a cold stone, you think it hard enough. In winter it may be necessary to add a little tallow. By means of this cement a piece of wood may be fastened to the chuck, which will hold when cool; and when the work is finished it may be removed by a smart stroke with the tool. Any traces of the cement may be removed from the work by means of benzine.

Wollaston's White Cement for Large Objects.—Beeswax, one ounce; resin, four ounces; powdered plaster-of-paris, five ounces. Melt together. To use, warm the edges of the specimen and use the cement warm.

Gutta-Percha Cement.—This highly recommended cement is made by melting together in an iron pan, two parts common pitch and one part gutta-percha, stirring them well together until thoroughly incorporated, and then pouring the liquid into cold water. When cold it is black, solid and elastic; but it softens with heat, and at 100 Fah. is a thin fluid. It may be used as a soft paste, or in the liquid state, and answers an excellent purpose in cementing metal, glass, porcelain, ivory, etc. It may be used instead of putty for glazing windows.

RULE for finding the weight necessary to put on a shaft valve lever, when the area of valve, pressure, etc., are known: Multiply the area of the valve by the pressure in pounds per square inch; multiply this product by the distance of the valve from the fulcrum; multiply the weight of the lever by one-half its length; then multiply the weight of the valve and stem by their distance from the fulcrum; add these last two products together, subtract their sum from the first product, and divide the remainder by the length of the lever, the quotient will be the *weight* required.

UNITED STATES MILLER.

PUBLISHED MONTHLY.

OFFICE, 62 GRAND OPERA HOUSE, MILWAUKEE, WIS.

Subscription Price.....$1 per year in advance
Foreign Subscription.....$1.50 per year in advance

ANNOUNCEMENT.

MR. P. SCHNEITLER, *Berlin, N. Mueller St., 179 B, is duly authorized to receive subscriptions and advertisements for the* UNITED STATES MILLER, *from all parts of Continental Europe, and to receive payment for the same.*

WM. DUNHAM, *Editor of "The Miller," 69 Mark Lane, and* HENRY F. GILLIG & CO., *449 Strand, London, England, are authorized to receive subscriptions for the* UNITED STATES MILLER.

MILWAUKEE, JULY, 1880.

MILLERS' ASSOCIATION DIRECTORY.

NATIONAL ASSOCIATION.

President—George Bain,.....St. Louis, Mo.
Secretary and Treas.—S. H. Seamans, Milwaukee, Wis.
VICE PRESIDENTS—L. Fletcher, Minneapolis, Minn.; Robert Tyson, Baltimore, Md.
ACTING EXECUTIVE COMMITTEE—Geo. H. Christian, Minneapolis, Minn.; S. H. Seamans, Milwaukee, Wis.; Alex. H. Smith, St. Louis, Mo.; Philip Haxall, Richmond, Va.; J. A. Hines, Rochester, N. Y.

STATE ASSOCIATIONS.

MINNESOTA—President, W. P. Brown, Red Wing; Secretary, Frank S. Hinkle, Minneapolis; Treasurer, W. F. Cahill, Minneapolis.

IOWA—President, J J. Snouffer, Cedar Rapids; Vice-President, H. Hammond; Secretary and Treasurer, J. R. Serrin; Executive Committee, J. R. Serrin, H. Hammond, G. F. Weist, F. J. Woodbury.

NEBRASKA—President, Elam Clark, Omaha; Secretary, C. D. Smith, Lincoln; Treasurer, E. J. Curson, Lincoln.

KANSAS—President, Robert Atkinson, Ottawa; Secretary and Treasurer, Frank H. Pope, Ottawa.

MISSOURI—President, E. Goddard, St. Louis; First Vice-President, John Crangle, St. Louis; Second Vice-President, J. O. Roberts, Clarksville; Secretary, D. B. Kirk, St. Louis; Treasurer, Geo. J. Plant, St. Louis.

KENTUCKY—President, Wm. N. Potts, Richmond; Vice-Presidents, Jno. E. Miles, Frankfort; Wm. Shaw, Paris; C. J. Grover, Mt. Sterling; L. H. Nottnagel, Lexington; Secretary, E. D. Hix, Payne's Depot; Treasurer, A. Weisenberger, Payne's Depot.

ILLINOIS—President, D. B. Sparks, Alton; Secretary and Treasurer, C. H. Seybt, Highland.

WISCONSIN—President, E. Sanderson, Milwaukee; Secretary and Treasurer, S. H. Seamans, Milwaukee.

MICHIGAN—President, J. D. Hays, Detroit; Secretary and Treasurer, W. Hibbard, Grand Rapids.

INDIANA—President, Nicholas Ellis, Evansville; Secretary, H. H. Emery, Indianapolis; Treasurer, D. A. Richardson, Indianapolis.

OHIO—President, F. Schumacher, Akron; Secretary and Treasurer, Robert Colton, Bellefontaine.

MARYLAND—President, Robert Tyson, Baltimore; Secretaries, J. Olney Norris and W. B. McAtee, Baltimore; Treasurer, W. H. Woodyear, Baltimore.

NEW YORK—President, Geo. Motley, Rochester; Secretary and Treasurer, J. A. Hines, Rochester.

TEXAS—President, John Kerr; Secretary, M. Gray, Dallas; Treasurer, P. S. Sheppard, Houston.

PENNSYLVANIA—President, Chas. D. Miner, Wilkesbarre; Secretary and Treasurer, A. Z. Scheck, Selinsgrove.

THE MILWAUKEE PRACTICAL MILLERS' ASSOCIATION—President, Chas. Mueller; Vice-President, Levi Hicks; Recording Secretary, H. W. Sherwood; Financial Secretary, Louis Holtz; Treasurer, E. Dellaus; Usher, Edward Hiemke.

THE NATIONAL ASSOCIATION OF BRITISH AND IRISH MILLERS—President, Mr. Alderman Hadley, City Flour Mills, London, England; Secretary, J. H. Chatterton, 69 Mark Lane, London, E. C., England.

We send out monthly a large number of sample copies of THE UNITED STATES MILLER to millers who are not subscribers. We wish them to consider the receipt of a sample copy as a cordial invitation to them to become regular subscribers. We are working our best for the milling interest of this country, and we think it no more than fair that our milling friends should help the cause along by liberal subscriptions. Send us One Dollar in money or stamps, and we will send THE MILLER to you for one year.

MILLERS' DIRECTORY FOR 1880.

All mill-furnishers, flour brokers or other parties desiring to reach the flour mill owners and millwrights of the United States and Canada, should have a copy of the above named work. It contains about 15,600 names with Post-office addresses, and in many cases (notably in Wisconsin and Minnesota) gives the number of runs of stone, sets of rollers, and kind of power used, or the capacity in barrels. A limited number of copies only have been printed. Upwards of 75 of the leading mill-furnishing houses and flour brokers in this country and several in Europe have already secured copies. Send in your orders at once. Price Ten Dollars, on receipt of which Directory will be forwarded post-paid by mail, registered. Address

UNITED STATES MILLER,
MILWAUKEE, WIS.

Mr. Wm. Dunham, Jr., son of the editor and proprietor of the London *Miller*, paid us a visit recently. Mr. Dunham is well pleased with his trip, and shows an appreciative spirit of all which he is called on to investigate.

If you are not already a subscriber to the UNITED STATES MILLER, *send one dollar at once and begin with our May number, which commences the fifth volume.*

J. T. Grano, Berger's Store, Va., is putting in two 16½-inch Burnham turbine wheels and new fit gearing, furnished by the Christiana Machine Company, Christiana, Pa.

Influence of Cut-offs on Engines.

The following report of M. Keller, on a memoir presented by M. Hallauer on "Steam Engines," has been translated for us from the *Bulletin de la Societe Industrielle de Mulhouse*, by S. H. Wheeler, of this city:

The work of M. Hallauer, of which I have the honor to present you a summary, is, as its title indicates, a study on the economical influence of the degree of cut-off in various types of steam engines. It tends also to support, on very numerous analyses, the conclusion of the last memoir of the author, that is to say, the equality, in point of working expense, of Woolf engines and single cylinder engines, the advantage being rather on the side of the latter.

It is divided into three parts: The first comprising the researches relative to double cylinder engines; the second, those concerning single cylinder engines; finally, the third, summing up and comparing the results obtained.

We will follow M. Hallauer successively in the study which employs us, and we will take the order adopted by him; that is to say, that after having studied the double cylinder engines, we will examine those with a single cylinder, summarizing for each type, and drawing conclusions then on the whole business.

FIRST PART—DOUBLE CYLINDER ENGINES, CALLED WOOLF ENGINES.

M. Hallauer cites at first all that has been said on the advantage of engines of this system, and, after discussion, comes to the conclusion that the only prime consideration truly serious and incontrovertible, which militates in its favor, is this: That the difference of the stresses from the commencement to the end of the stroke is not so great as in the other types, and that, in consequence of this better distribution, the working of the engine is much more easy. As to the useful effect of a two-cylinder engine, the brake trials executed under the auspices of your committee on mechanics, have shown that the Woolf engines absorbed more power for themselves than the single cylinder engines, which was otherwise easily foreseen.

Passing then to the examination of the influence of a cut-off in the small cylinder, M. Hallauer commences by examing the results obtained:

1st. In a series of trials executed by himself in 1877, on a vertical, beam, Woolf engine, situated at Munster, and coming from the workshops of the Societe Alsacienne de Constructions Mecaniques.

2d. In the trials made in 1876, under the auspices of your committee on mechanics, on a horizontal Woolf engine from the same builders, report of the trials having appeared in the *Bulletin* of July–August, 1877.

3d. In those made in February 1877, by the Association Alsacienne des Proprietaries d'Appariels á Vapeur, on an engine at Malmerspach, furnished by the same builders, but fitted with a variable cut-off in the small cylinder, actuated by the governor and put on by the Societe des Ateliers de Constructions Mecaniques de Bitschwiller-Thann.

4th. In the trials made at Saint Remy by M. Queru, and at Rouen by the Association Normande des Proprietaries d'Appariels á Vapeur, on two vertical, beam, Woolf engines from the workshops of Messrs. Thomas & Powel, of Rouen.

Having eliminated the trials in which the verification was not sufficiently exact, M. Hallauer determined the consumption of dry saturated steam per hour, per absolute horse power, per indicated horse power, and per effective horse power, per hour, basing his calculations on the sum of the calories of heat supplied to the cylinder by the steam and water leaving the boiler; in other terms, by substituting for the entrained water the quantity of steam which the same number of calories of heat would have furnished to the cylinder as this water has taken there, and taking account also of the calories left in the steam jacket by the steam which is condensed there. He passes then to the analysis of each trial, and determines the quantity of steam and suspended water at the end of the admission and at the end of the stroke, the variations of the internal heat, and finally, the cooling effect Rc in the condenser. This cooling effect is verified by two different methods already explained several times by M. Hallauer in your *Bulletins*.

I ought to pause here a moment to say a few words on the verification of the trials.

M. Hallauer's very elegant method of investigation has already been given in his last work; but I believe that it is not useless to repeat it here, in order the better to appreciate its importance.

When it is desired to take account of the quantity of steam expended during a given time by a steam engine, the quantity of water fed to the boiler is measured. This quantity of water, increased or diminished by a weight easily calculated, according as the water level in the boiler is higher or lower after the trial than before, gives the quantity of steam used. A method given by M. G. A. Hirn, and published several times in your *Bulletin*, suffices to determine the proportion of water entrained in the steam. This constitutes the direct determination, which is verified in the following manner:

Single Cylinder Engines.—Table II.

Corliss—Steam Jacket.	Hirn—Without Steam Jacket.											
Saturated Steam.	Saturated Steam.			Superheated Steam.								
I.	II.	III.	I.	II.	I. 196°	II. 230°	III 278°					
1-11 105	1-8 157	1-6 158	1-7 107	1-4 146	1-7 113	1-4 154	1-2 125					
9%1	9%3	2%4	0.1%	0.7%	0.6%	0.8%	0.6%					
7.188	7.236	7.307	7.822	8.449	6.656	7.000	7.874					
7.983	7.939	7.955	8.837	9.307	7.370	7.639	8.655					
9.071	8.724	8.646	9.922	10.341	8.188	8.207	9.511					
6.5%	6.%	5.3%					saprhtd					
38.3%	31.7%	25.3%	37%	31%	24.6%	6.5%						
21.7%	19.2%	18.5%	35.2%	25.2%	2'.4%	12%	13.2%					
11.21	11.14	11.15	37.61	37.53	18.90	16.61	20.84					
12.3%	9.8%	8%	21.6%	15.4%	12.5%	7.8%	10.5%					

Contigrade Measures.

Knowing the weight of water and steam supplied from the boiler, also the steam pressure in it, it is easy to determine the number of calories supplied to the engine per stroke of piston. This number of calories diminished by the external radiation, and by the heat absorbed in the work, ought to be equal to the number of calories absorbed by the water of condensation, which is obtained in gauging the water leaving the condenser and measuring its final and initial temperature. The method of performing this has been several times described. The difference between the number of calories supplied to the engine diminished by that of the calories absorbed in the work and the external radiation, and that of the calories found in the condenser, divided by the total number of calories, will give the percentage of error that will have been made.

One word, also, *apropos* of the work in absolute horse power, which has not always been easily understood.

The excellent works of M. Hirn have shown the enormous influence of the internal surface upon the manner in which the steam behaves inside the cylinder.

When two engines of different types or different dimensions are compared, or otherwise the work furnished by the same engine under conditions of varying work, it is the influence of the internal surface, which must be determined in order to make calculation, for each trial, of the manner in which the steam is utilized.

Now, whatever may be the construction of the condenser, this influence of the internal surface varies but little, while the vacuum, and consequently the indicated work, may vary within wide limits. The varyiabe vacuum, entering into the calculation if the engines are compared according to their indicated power, will tend to falsify the results. It is, therefore, compulsory to suppose that the engines which are being compared are provided with ideal condensers, furnishing a perfect vacuum behind the piston, and to compare the engines with reference to the work furnished with this perfect vacuum. It is this work which constitutes the absolute work of the engine, and it is the consumption for this absolute work which makes it possible to compare among themselves different engines or those operating under conditions of varying work.

It is well understood besides that, from a practical and industrial point of view, the better the condenser the better will also be the results. This is an affair of the constructor, and has but little influence on the manner in which the steam behaves in the interior of the cylinder. The absolute work is then the term of comparison, to employ from a theoretical point of view, in comparing between themselves engines of different types, or working under different conditions; but the effective work will always be the term of comparison from an industrial point of view.

This stated, I summarize in the following table the results of the verification and analyses of M. Hallauer, and I arrive with him to the following deductions. (See table I.)

Two Cylinder Engines.—Centigrade Measures.—Table I.

	Munster Engine.			Malmerspach Engine.				Vertical Woolf Engine.		Thomas & Powell Engine.	
	Trial I.	Trial II.	Trial III.	Trial B.	Trial C.	Trial D.	Trial F.*	Light Work.	Heavy Work.	Trial A'Nde.	Trial Quera.
Ratio of expansion	1-9	1-7	1-7	1-6	1-13	1-17	1-26	1-6	1-6	1-22	1-19
Indicated horse power	347	357	185	201.6	215	212.2	149.53	130	181	.....	137
Percentage of error, discovered by verification	1.25%	0.23%	1.2%	2.8%	4.9%	2.9%	2.5%	1.13%	7.06%	9%	3.5%
Consumption of dry saturated steam per hour per absolute horse power (kilos)	7.112	6.946	7.384	7.402	6.872	6.983	6.821	7.293	7.328	This trial has been neglected on account of not verifying itself.	6.840
Consumption of dry saturated steam per hour per indicated horse power	8.614	8.739	9.736	8.84	8.149	8.210	8.250	9.120	8.878		7.591
Consumption of dry saturated steam per hour per effective horse power	9.864	10.357	12.411	10.301	9.465	9.517	9.888	10.563	9.975		9.702
Proportion of steam condensed in the jacket.	8.6%	9%	10.4%	5.1%	7.7%	.....	.....	10%	10.8%	.....	.....
Proportion of water contained in the steam at the end of the admission	16.17%	14.21%	21.17%	12.8%	23.7%	.....	.....	11.29%	10.8%	.....	.....
Proportion of water contained in the steam at the end of the stroke of the small piston.	19.1%	.....	.....	.....	13.1%	.....	.....	.....	.....	.....	.....
Proportion of water contained in the steam at the end of the stroke of the large piston.	6.6%	5.39%	7.39%	11.5%	17.9%	.....	.....	5.34%	4.5%	.....	.....
Negative work of the exhaust relative to the absolute work.	17.43%	20.52%	24.10%	16.4%	15.6%	14.9%	18.6%	21.06%	17.3%	.....	9.9%
Value of Rc	21.89	6.65	13.48	8.44	31.44	.....	19.34	1.95	1.15	.....	*
Value Rc % of calories supplied to the engine.	3.38%	1.82%	3.5%	2.1%	8.3%	.....	7.8%	1.19%	6.5%	.....	*

The trials made on the Munster engine, for which the variation of the work is obtained by means of a throttling by the regulating valve, give, as the difference of consumption per hour per absolute horse power, for the extremes of work 3 per cent, which represents the influence of the throttling.

In passing to the consumption per hour per effective horse power, the economy is much more considerable and increases to 20 per cent which arrises from the increasing influence of the counter-pressure, as the work furnished diminishes, and of the co-efficient of friction, which increases under the same circumstances.

M. Hallauer was led to conclude in his previous work that the most simple method of regulating consisted in a cut-off variable by hand and a governor operating on a valve, the regulation by hand to be employed for considerable variations, the valve serving to maintain the regular speed despite the small perturbations in the quantity of the work required at each instant.

The author of the work explains also, by simple considerations based always on the influence of the cylinder walls, different apparent anomalies, which seem to result from the trials. I will not enter into those details which will necessitate giving again the whole work; all prove that the practical theory indicated by M. Hirn, and which M. Hallauer applies here, suffices to explain all the phenomena which take place in the interior of the cylinders. After having studied the condensations and the evaporations in the interior of the small and the large cylinders, M. Hallauer comes to the following important conclusions, which I collect under a little different form from that adopted by him:

1. Having given a boiler working at 5k 5 of pressure (78.22 pounds per square inch), for example, and a Woolf engine capable of furnishing at this pressure a maximum force of A horse power, there is a possibility of obtaining, industrially, at least 10 per cent of economy in cutting off in the small cylinder in place of throttling the steam, when on account of circumstances the engine ought to furnish only half of the work of A horse power. The economy will diminish as the work approaches to A.

*Not having the original minutes of the curves, the analysis has not been completed.

2. The engine working in the neighborhood of its maximum power, its power can be varied 10 per cent by the withdrawing produced by the valve without any noticeable change in the economical regime.

The importance of these conclusions is seen at once. In point of fact, there are few Woolf engines working at their maximum power. Besides some builders of our vicinity when they furnish an engine, rate it at least one-half less power than it really is.

Thus an engine sold for 100-horse power can ordinarily furnish 200 without being at its maximum; this style of working presents some practical advantages, but it is nevertheless true that when this engine makes only 100-horse power, regulated by throttling, it consumes 10 per cent. more than it would have consumed if this work of 100-horse power had been obtained by admitting at full pressure and cutting off in the small cylinder.

I am not, however, altogether of the same opinion as M. Hallauer when he prefers a cut-off variable by hand; I believe that from a practical point of view a cut-off variable by the governor works better, for it insures against any neglect of the engineer, who can not nearly so well give the cut-off called for at the moment as when it is left to its own free will; besides we have almost always observed that the cut-offs variable by the governor give a steadier speed than those regulated by the valve.

SECOND PART—INFLUENCE OF THE CUT-OFF IN SINGLE CYLINDER ENGINES.

M. Hallauer proceeds for these engines as he has done for those of two cylinders; he first verifies the trials on which he depends, then he analyzes them.

The documents serving in this examination give the following experiences:

1. Those executed under the auspices of your mechanical committee in April and May, 1878, on a Corliss engine constructed by Messrs. Berger, Andre & Co., of Thann.

2. Those enterprises in 1873 and 1875 by Messrs. Hallauer, Groseteste and Dwelshauvers-Dery, under the direction of M. G. & A. Hirn, and executed on an experimental engine, unjacketed and working with superheated steam, or with saturated steam. We group the results of the verifications and of the analyses in table II.

Examinations of these results show:

1. That for the Corliss engine with steam jacket there is a theoretical economy (per absolute horse-power) of 1.6 per cent. in passing from $\frac{1}{8}$ to 1-11 cut-off, but that industrially this economy disappears and changes its sign, and there is a practical advantage (per effective horse-power) of 4½ per cent. by working with a cut-off of $\frac{1}{8}$ in place of a cut-off of 1-11.

2. That for the unjacketed engine without super-heat the economy furnished by the cut-off is much more considerable, since on the Hirn engine working with saturated steam there is a theoretical economy of 7.4 per cent. at 1-7 instead of $\frac{1}{4}$ cut-off, and that industrially this economy still remains at 4 per cent.

3. In taking account of the difference of the super-heat of the trials I and II (196° and 231°—384° F. and 447° F.) it is noticed that this influence of the cut-off in the unjacketed engine remains with super-heated steam what it was with saturated steam.

Trial III. with super-heat proves still more the great economy of the cut-off in these circumstances, when certain limits are passed, since between one-half admission and one-seventh there is 15 per cent of economy, which would have been still more considerable if during trial I. the work had been done with the same super-heat as during trial III.

4th. In the Hirn engine the trials with saturated steam give at the end of the stroke the same weights of water, .0940 and .0927, in the cylinder, and the cooling effects by the condenser are also the same, 37.58c and 37.02c; therefore, unjacketed, the same weights of water give the same values of Rc. For the Corliss engine, on the contrary, with different weights of water, .0298 and .0398 at the end of the stroke give the same values for the cooling by the condenser, 11.21c and 11.15c, a result which comes from the steam jacket. For the trials II. and III. with super-heat, the weights of water at the end of the stroke are .0367 and .0378, and the cooling by the condenser 16.61c and 20.34c, a difference which must be attributed to the super-heat, for in the same conditions the saturated steam gives equal cooling effects by the condenser for the weights of water evaporated at the end of the stroke. Which shows that the super-heat works differently from the steam jacket.

Analyzing the variation of internal heat in the various trials which concern us, and the values of the cooling effect by the condenser which result from differences of cut-off, according as we work with or without jacket, with or without super-heat, M. Hallauer is also convinced of the different mode of action of the jacket and super-heat.

The jacket works more actively than super-heat and in the same sense, during the period of expansion, but becomes disadvantageous during the condensation; for then, supplying heat to the water which covers the interior walls of the cylinder, it augments the cooling effect of the condenser, which is not produced by super-heat, and which renders the latter more economical in the majority of cases. Examining, then, the theoretical economy, in comparing the consumptions per hour per absolute horse power and the industrial economy, in comparing them per hour per effective horse power, the author comes to the conclusion with M. Zeuner that high grades of expansion are economical from a theoretical point of view, and with M. Hirn, that it is inversely from an industrial point of view.

Thus, the conclusions of these two savants which seem to contradict, are found to agree in taking into account the different considerations which have guided each of them; the one, M. Zeuner, having made the general study of steam engines, in arguing from unrealizable considerations (impermeability to heat of the cylinder walls); the other, M. Hirn, on the contrary, having studied them from an industrial point of view, in taking account of the permeability of the cylinder walls to heat and of the work absorbed by friction.

THIRD PART—COMPARISON OF THE DIFFERENT TYPES OF ENGINES STUDIED.

The conclusion of M. Hallauer's work comprehends the comparison of two cylinder engines and single cylinder engines, in reckoning always from thanalysis of the trials which have served for the two first parts of the work. He reiterates at the beginning what he understands by absolute, indicated and effective horse power.

The absolute power is the work which the engine would have given with an ideal condenser making a perfect vacuum behind the piston. (It is the theoretical work.)

The indicated work is that furnished directly by the steam on the pistons; it takes account of the influence of the back pressure. (It is the power calculated from the diagram drawn by the indicator.)

The effective power is finally the work industrially available; it takes account of the influence of the back pressure and the friction of the various organs of the engine itself.

This premised, there are two trials verified, the one made on a Corliss engine, $\frac{1}{8}$ cut-off; the other on an engine at Malmerspach, 1-13 cut-off, the figures of which are as nearly alike as possible.

	Corliss Engine.	Woolf Engine.
Water contained at the end of admission.....	25.%	23.7%
Water contained at the end of expansion.....	18.5%	17.9%
Difference of initial and final heat.....	1.83 calories	1.24 calories
Cooling effect of the cylinder,.....	8.3 "	8. "

The comparison of these two trials lead to some very interesting conclusions.

A phenomenon to be immediately noticed for the Woolf engine serves to destroy that false idea held till now, that in the two cylinder engines the refrigerating influence of the condenser is reduced one-half.

Indeed, in the small cylinder, the half-stroke cut-off gives rise to an evaporation of 10.6 per cent of the weight of water contained at the end of the admission, and the internal heat increased much more rapidly than in the Corliss engine. Then the mixture of steam and water passes to the large cylinder with 13.1 per cent of water, and in place of the evaporation continuing in this cylinder, there is, on the contrary, condensation, despite the influence of the jacket, since at the end of the stroke we find 4.8 per cent more water separated than at the end of the stroke of the small piston. This points to a great condensation at the moment of the entrance of the steam into the large cylinder, a condensation which is so powerful that, in spite of the effects of the jacket, all the steam that is condensed in the large cylinder in excess ofthat which was already in the small, cannot be evaporated.

In the Corliss engine, on the contrary, evaporation is continued to the end of the expansion. It is easily seen, therefore, that the influence of the large cylinder, in case of an expansion commenced in the small one, does not tend always to reduce the losses of heat, but that on the contrary, it can sometimes augment them, which contradicts that which was until now admitted.

The consumptions of dry saturated steam per hour per absolute horse power, give the theoretical economy realized by either engine. If we take the consumption of the Corliss at what it would have been with 1-13th cut-off, which is that of the Woolf engine for the trials which we are comparing, we find that the theoretical economy is 4 per cent in favor of the Woolf engine; but the influence of the counter pressure, and still more that of the friction, reduces this economy as soon as we pass into the industrial domain, it then changes sign, and we find that the practical economy becomes 8.7 per cent in favor of the Corliss.

Comparing the horizontal Woolf engine with the Corliss, in taking account of the absence of compression in the former, M. Hallauer still found a theoretical economy of 4 per cent for the Woolf engine. But this economy also disappeared in practice, and then again, the Corliss engine became industrially superior by 9.5 per cent to the horizontal Woolf engine; nevertheless in taking account of the construction of this latter, the difference fell to 2 per cent, and then the horizontal Woolf engine consumed only 8.8 kilos of dry saturated steam per hour per effective horse power, which would be the minimum to which we could attain by a careful construction of the condenser and a greater compression. In concluding, M. Hallauer collects in a table II., the consumptions of steam per hour, per absolute, indicated and effective horse power, adding the consumptions of coal per effective horse power per hour, in supposing that a kilogramme of coal evaporates 8 kilos of water.

This table shows that the various double cylinder types studied, consumed from 9k 1 to 9k 5 of steam per hour per effective horse power; the Corliss engine with $\frac{1}{8}$ cut-off consuming only 8k 6, whilst the Hirn engine with superheated steam has only 8 kilos of consumption with 1-7 cut-off. Recapitulating the work of M. Hallauer, which is one of those laborious and conscientious studies, to which he has for a long time habituated our society, is very remarkable in its conclusions and tends to prove once more the impossibility of stating anything about steam engines with the precision of fact, if one does not support himself on verified trials of existing engines.

We have been obliged in this epitome, to neglect many interesting things and to seek principally to set forth the various conclusions of M. Hallauer; but everybody engaged with steam engines will certainly find in his work exceedingly useful material, which can serve in many circumstances. We ought then, with the utmost good will, to thank M. Hallauer for all these studies which make enormous demands upon time, patience and reflection; all which he has certainly not spared in his last memoir. You know besides, that he is clad in truth, as you have been able to judge by the numerous works which he has already presented to our society; of which this last, gives, in some degree, the most interesting practical conclusions.—*Mining and Scientific Press, San Francisco.*

In some reminiscences of Granite Falls, the *Minnesota Farmer* gives the following interesting sketch: "In 1873 the Stoddard & Libbey flouring mill was built by a gentleman named Fuller. The recent completion of the mill of J. W. Hixon & Bro., gives us three mills within a very short distance of the business portion of the town. A magnificent elevator, with a capacity for storing 225,000 bushels of wheat, has recently been completed, and is the property of B. F. Pillsbury. The excellent water power of the Minnesota river at this point, including that of the Minnesota Falls, consists of a succession of rapids, ten in number, extending along the river at a distance of from eighty rods to a mile apart. The rapids vary in fall from five to fourteen feet, the total fall being between sixty-five and seventy feet. Experienced engineers who have taken a level of the river here, give it as their opinion that there is a power in the various falls equal to 12,500-horse power, or sufficient to run one hundred and twenty-five run of wheat burrs and other small machinery that may be used, such as planing mills, founderies, etc. The lower power owned by Werden & Austin, with twelve feet head, runs five run of wheat burrs. The central power is owned principally by W. W. Pinney, and is partially improved. It runs a first-class six-run merchant mill, fully equipped, with patent process, chilled crushers, etc. The first of the upper powers, being above town, is improved, and a two-run grist mill is operated by Stoddard & Co. The power is sufficiently improved to give ten feet head. The last of the series is improved, and is used to operate the machinery of a foundry and machine shop. This power is owned and operated by Hixon Bros. Other powers are to be improved shortly, and at no distant day the mills at Granite Falls will have sufficient capacity to grind all the wheat that will be raised within a radius of twenty-five miles."

The Ultimate Applications of Steel.

The more the subject of the manufacture and uses of steel is inquired into, the more does it seem incapable of exhaustion. Great things have been accomplished in the past, but much yet remains in the future. The manufacture of steel is far from finality. Even now some of the leading steel works in France are essaying the production of ingots of 100 tons weight. Steel, indeed, may be compared, in reference to its multifarious uses, with the elephant's trunk, the adaptability of which enables it with equal ease to pick up a needle or to pull up a tree. High authorities have expressed the opinion that steel will have the future nearly altogether to itself, displacing copper for fire-boxes, etc., silver for articles of ornament, and lead for purposes of softness, as much as it is superseding iron in respect of utility, economy and endurance. And as it is difficult to set bounds to the ultimate applications of steel, so it is impossible to limit the means of its production. Recent metallurgical progress has indefinitely increased the resources available for the latter purpose. Science has at last found a method of ridding of their deleterious contents the ores of iron heretofore unsuited for the manufacture of steel, and henceforth, if metallurgists of experience are not greatly deceiving themselves, the cheapest and most plentiful ores will, by one of the greatest chemical triumphs of the age, be raised to the same rank as the richer, and comparatively limited ores that have alone been deemed fit for the steel manufacture until now. The horizon of the future, therefore, is not bounded by any limitation of the supplies of raw material. Nor is it any more likely to be measured by the uses of steel, for they are multiplying every day, and as the manufacture is cheapened and improved, so will the applications continue to increase. In the track of this movement many changes must follow, and have even already occurred, of which we have been able to take but scant cognizance. The hard and irksome work of the puddler has been superseded by less arduous and, in the main, by less skilled labor. One of our greatest authorities has calculated that to convert fluid cast iron into steel, the labor required is only about one-third of that required to convert pig metal into wrought iron, while the fuel consumed is only about one-fourth of that formerly used. The economy of coal is, therefore, another important corollary of the advance of steel, and this economy, great though it be in the aggregate, is trifling in comparison with that accomplished through the greater strength and endurance of that which we are fully justified in describing as the metal of the future. —*J. S. Jeans, Secretary of Iron and Steel Institute.*

Selecting Tool Steel.—Hardness, tenacity, facility of working under the hammer, and of receiving temper, are requisites of good tool steel. The presence or absence of some of these qualities cannot be ascertained except by actual experiment; yet good judgment will enable a man to ascertain, with an approach to accuracy, the quality of steel without subjecting it to the action of fire and water and the hammer. Pure iron contains no carbon, but tool steel contains from 1 per cent. to 2 per cent. So small is this amount, that it is not surprising that it requires judgment and experience to select steel in the bar. One of the tests is to apply a drop of nitric acid to the surface of a fresh fracture. It will leave a black stain on good steel, but not on iron or low steel. Another test is to observe the color and texture of a freshly made fracture. This should present a fine grain, with a dull silvery luster, and of uniform color. Poor steel may show a close grain, but it will be mottled in color. But the only sure test is in working the steel. Draw the end of the bar, heated to a cherry red, under the hammer, to a fine point. If it will admit of being so pointed, that is a good indication. Plunge it into the hardening bath while hot; and, when chilled, give it a few gentle blows with the hammer. If it is tough and does not fly, but requires some hammering and bending back and forth to break it, that is another good indication. If the fracture shows a fine, even, lively grain, the test is complete, and the workman may be satisfied. One of the best of tests is to make and temper a cold chisel from the bar. If it stands well the chipping on a casting, the steel will make good turning tools. But, after all, the good judgment of the experienced forger is worth more than empirical tests.

UNITED STATES MILLER.

E. HARRISON CAWKER, EDITOR.

PUBLISHED MONTHLY.

OFFICE, 62 GRAND OPERA HOUSE, MILWAUKEE, WIS.

SUBSCRIPTION PRICE.—PER YEAR, IN ADVANCE.

To American subscribers, postage prepaid..... $1 00
To Canadian subscribers, postage prepaid..... 1 00
Foreign Subscriptions..... 1 50

All Drafts and Post-Office Money Orders must be made payable to E. Harrison Cawker.

Bills for advertising will be sent monthly unless otherwise agreed upon.

For estimates for advertising address the UNITED STATES MILLER.

[Entered at the Post Office at Milwaukee, Wis., as second-class matter.]

MILWAUKEE, JULY, 1880.

Subscribe for the U. S. MILLER; $1 per year.

WE have received a copy of the *Maine Mining Journal*, published at Bangor, Me. It is of value to all interested in mining matters.

WE call the attention of our readers to the new advertisement of the Welch Wheat Heater, manufactured by Albert B. Bowman, of 703 Market street, St. Louis, Mo. Write to him for particulars.

MR. W. N. DURANT took a premium for his electric flour tally, and has received a great deal of praise for his inventive skill. It seems to be only a question of time when the electric tally will be introduced into every mill.

THANKS to Messrs. John T. Noye & Sons, of Buffalo, N. Y., for a copy of their handsome new catalogue. Millers should have a copy of it for reference. Sent free on application by millers.

THE new Neenah, Wis., roller system is said to be a great success. As yet but few particulars have been learned by inquisitive outsiders, but those who have been permitted to inspect it tell of wonderful results.

THE Cockle Separator Manufacturing Co., of Milwaukee, have added another medal to their collection at the late Millers' Exhibition in Cincinnati. There are few machines so well known and so universally endorsed as their cockle machines.

We will send a copy of the MILLERS' TEXT BOOK, by J. M'LEAN, of Glasgow, Scotland, and the UNITED STATES MILLER, for one year, to any address in the United States or Canada, for $1.25. Price of Text Book alone, 60 cents. Send cash or stamps.

We respectfully request our readers when they write to persons or firms advertising in this paper, to mention that their advertisement was seen in the UNITED STATES MILLER. *You will thereby oblige not only this paper, but the advertisers.*

THE Millers' National Association has on hand a balance in cash of $1,689.89, and a membership larger than ever, and the assessments will undoubtedly be small for years to come. Fair sailing in the future will be the regular order with now and then, perhaps, an occasional squall of litigation.

THE recent Millers' Inter-national Exhibition has in many respects been a grand success. It turned out much grander and better than its friends could reasonably hope for. The principal fault found is with the awards. It may be true that some of these were made too hurriedly, but the difficulty of keeping the committees together at times was very great. The weather was oppressive, and members of committees were of course anxious to finish up business and get home. Take it all in all, for a first Exhibition its character is highly to be commended, and the experience gained will prove of untold value to managers of the next Exhibition. The officers one and all are deserving of great praise for their arduous labors.

THE following communication has been received:

MILLERS' NATIONAL ASSOCIATON,
SECRETARY'S OFFICE,
MILWAUKEE, July 6, 1880.

Dear Sirs:—At a meeting of Executive Committee of the Millers' National Association, held during the Convention at Cincinnati, the following resolution was unanimously adopted:

WHEREAS, It is desirable to extend the membership of this Association to parts of the country where State Associations do not exist, or where State Associations are not members of the National Association;

Resolved, That after this date new members be admitted from such States direct to the National Association on payment of five dollars per run of buhrs as initiation fee, and taxable thereafter with such new assessments as shall be levied on all members.

The assessments are made upon all buhrs operating on wheat, middlings or bran.

In pursuance of the above resolution I respectfully invite you to join with us in promoting the objects of the organization, which are declared by the Constitution to be "The Mutual Protection and Benefit of its Members."

As an illustration of the power of the organization and its benefit to the milling interest I need only refer you to its hitsory during the past three years, during which time it has collected and expended for the common interest upwards of $190,000, fought two of the most prominent and thoroughly organized patent rings successfully through the lower courts, and compromised on another claim, believed to be just, for one-tenth the original demand; while its benefit to the milling interest in the way of social intercourse, discussion of improved methods and machinery, and its influence on legislation, transportation and commerce can hardly be estimated.

As the time for accepting members at this extremely low rate is limited, you will consult your own interests largely by filling out and returning the enclosed postal card *at once*.

Respectfully, S. H. SEAMANS, Sec.

N. B.—The above rate does not apply to millers in States where there is a State organization.

The Smith Purifier Ahead.

The course pursued by the Geo. T. Smith Purifier Company at the Millers' International Exhibition offers an example worthy of commendation and imitation. Among the first to secure space, they were early on the ground with their machines, and the opening day found them with by far the most comfortable and attractive quarters on the second floor of Power Hall, and with belts on their pulleys ready for the starting of the big engines. On every day from May 31 to this, the date of our last issue, they have been forward in every good word and deed for the advancement and profit of the great Exhibition. Meeting with much that they might have complained of, in no single case have they uttered a word of protest or spoken of the officers of the Exhibition, its management or result in other than the kindest and most encouraging terms. They have paid no attention to the empty vaporings of self-proclaimed rivals; have not even dignified by their notice the aggravating and unjustifiable attacks which have been made upon them, but have treated all alike with an even and unaffected courtesy.

Too generous to point out the defects and publish the failures of other purifiers, they have still not neglected to zealously urge the advantages of their own machine.

Secure in a trade larger than that of all other manufacturers of purifiers combined, they have been as careful and paintaking with the smallest prospective purchaser as if they had yet to sell their first machines.

Aside from the unrivalled excellence of their machine, the wonderful success of the Geo. T. Smith Purifier Company is an open secret, which we trust has been learned and will be practiced by many other exhibitors in the future. The prizes won by this firm are amongst the highest offered to the competition of exhibitors. They secure the first premium on Middlings Purifiers; first premium for Millstone Exhaust; first premium for Dust Rooms, and last, best, and by far the highest of all, the greatest of all, the great Lockwood Medal, awarded under the following rule:

"This gold medal shall be awarded by a committee of three (3) disinterested and competent jurors (to be appointed by the Board of Commissioners of the Millers' International Exhibition) to the machine or improvement in machines of great merit invented within the past ten (10) years, and which shall mark extraordinary progress and utility in its application to the milling or grain interests to be exhibited in successful operation during the Exhibition."

In addition to the above, they won, and should have received, the premium for best barrel of flour made in the Exposition Building, and the Dessau Gold Medal which accompanied this award. When we say *they* won it we know whereof we speak. That these laurels are not credited to them, simply attests their liberality to their allies.—*Miller and Millwright.*

D. J. Hyden, an excellent millwright, is remodeling John W. Coiner's mill at Waynesboro, Va., and has purchased the necessary machinery of the Christiana Machine Company, Christiana, Pa.

Robert B. Mood, of Wilmington, N. C., is building a new grist mill for Capt. D. Merchason, of that place, and has placed his order with the Christiana Machine Company, Christiana, Pa., for the machinery and two turbine wheels (42 and 48-inch).

The Millers' International Exhibition.

GENERAL NOTES.

In the Missouri flour and grain exhibit the sample of flour from the Queen Mills at Carrollton, Mo., attracted much attention for its general appearance and strength. The brand is called "Snowflake." Thirty pounds of it were taken by the Vienna bakery at the exhibition which made fifty-seven pounds of dough, and the bread baked therefrom was very white and good. Messrs. Ennis & Co. are the proprietors of the Queen Mills at Carrollton, Mo., and have a steady demand for their different brands.

During the first week of the exhibition the Cockle Separator Manufacturing Co., of Milwaukee, sold at their stand machines to the following parties: W. N. Potts & Sons, Richmond, Ky.; M. Deguire, Fredericktown, Mo.; Joseph Wagner & Co., San Francisco, Cal.; Thos. Lewis, Bangor, North Wales; Littler & Williams, Abergele, North Wales.

James McDaniel, Esq., the head miller of the Washburn C Mill, of Minnespolis, was present at the exhibition at the time the premium was awarded to the flour manufactured under his direction, and was happy over the result, as he might well be.

Messrs. Howes, Babcock & Co., of Silver Creek, N. Y., were represented at the exhibition by Messrs. Simeon and David Howe, Henry Hamper, Mr. Blackmer, Mr. Walker, Mr. Bell, Mr. Early, of Lynchburg, Va., and Mr. J. B. Martin, superintendent of the woodworking department of their works at Silver Creek. These gentlemen were kept busy most of the time in showing up and taking orders for their various grain-cleaning machines and the Eureka flour packer.

John A. Hafner, of Pittsburg, Pa., had on exhibition an eight-run model mill driven by a steel belt. Mr. Hafner claims that steel belting will in time take the place of leather belting at a great saving of cost. His equilibrium driving pulley to prevent the side pull on the mill spindle was universally endorsed by those who examined it.

Mr. W. N. Durant, of Milwaukee, created much interest with his electric tally for attachment to flour packers to register ¼, ½, ¼ and barrels of flour as packed. Orders were given him for his ingenious device from all parts of the country, from Maryland to California. His thermometer attachment for heaters was also well spoken of.

Andrew Hunter, the middlings purifier man, was on hand with a full line of his machines and evidently considered himself master of the situation. His machines were handsomely finished and attracted much notice. He says his trade was never better.

William Lehmann, of Milwaukee, Wis., was on hand with his patent method for truing millstone faces, and his improved adjustable millstone bosom staff. His stand was crowded as much as anybody's in the whole show, and if practice will do it, Mr. Lehmann will soon be a rattling good lecturer on milling subjects. One evening there was a great deal of interest and excitement over a competition with other staffs, and Mr. Lehmann seems to have come off in flying colors. Mr. Lehmann's method is a good one, and his adjustable staff is so constructed that any slope may be obtained desired, from the eye to the skirt or grinding surface of the stone. Mr. Lehmann believes only in the use of corrugated rolls for finishing the bran.

Messrs. Teter & Allen, of 404 Commerce street, Philadelphia, Pa., had on exhibition a full line of middlings purifiers, bolting reel attachments, millstone rubbers, etc., and did a good business.

Messrs. John T. Noye & Sons, of Buffalo, N. Y., had a good display of their specialties under a handsome canopy in the horticultural hall. The display consisted of various milling tools, roller mills, aspirators, grain cleaning machinery, etc. Mr. J. Karns was in charge of the exhibit, and was assisted at times by Messrs. Noyes and Capt. E. W. Pride, their agent at Appleton, Wis.

Messrs. Stout, Mills & Temple, of Dayton, O., had their stand in the southwest corner of Power Hall and exhibited their celebrated turbine water wheels, roller mills and mill supplies in general. Mr. Mills was in charge of the exhibit, assisted by competent gentlemen, and was kept busy. The demand for their water wheels is greater than ever, and they are now in use in all parts of the civilized globe.

The Cockle Separator Manufacturing Company, of Milwaukee, Wis., had a handsome specimen of their machines in operation in the gallery of Power Hall in charge of Mr. Gilbert. This machine is well known in the leading mills of this country and Europe, and needs no comment here. Mr. Gilbert made numerous sales to American, Canadian and European millers.

Mr. George Bain, President of the Millers' National Association was presented with a valuable gold watch and chain by the mill-furnishers represented at the exhibition. The present was worth about $1,000. Mr. Bain was taken so completely by surprise at the presentation that for once his oratory failed him. Every one conceded that this token of esteem from his friends was just what he deserved. We hope the happy recipient may live to wear and enjoy it for a hundred years and a day.

June 14 a serious accident happened in Power Hall, caused by the bursting of the connections of the steam pipes just as the test trial of one of the steam engines was to take place. Pieces of the pipe were hurled about in different directions, and the building filled with steam, and a temporary panic of exhibitors and visitors ensued. Fortunately but two men, both millers, were injured. The names of the injured men are Alfred Osborne, of Palmyra, Harrison Co., Ind., and L. Becker, of Galveston, Tex.

The Board of Commissioners had much difficulty in getting the various committees to make awards together. Many from different sections of the country could not stay long enough, and, in many cases, substitutes had to be appointed.

All the stone dressing machines in the United States were fully represented at the exhibition and excited a good deal of interest. Lady visitors who are ever curious to know about strange things asked one of the exhibitors what the machine was for. "It is a miller's stone dressing machine," he replied. "Ah," said she, and walked off muttering, "I shall never marry a miller."

The Union Iron Works, of Decatur, Ill., had on exhibition several machines, amongst which were the "Western" warehouse smutter, cleaner and grader, corn-shellers and cleaners, etc. The machines were handsomely finished and attracted much attention.

Messrs. Reed & Seyler, of Cedarville, Stephenson Co., Ill., had their "Champion" middlings purifier in operation and turned out some excellent work.

J. H. Redfield, of Salem, Ind., had on exhibition his combined elevator and purifier, a machine which has been thoroughly described in our columns, and one of rare merit. Parties desiring to purchase purifiers, who did not attend the exhibition, should write to him for illustrated circular. His sales were quite large. Mr. Redfield has been interested in milling machinery for many years, and knows he has an excellent machine in hand now.

HARDENING AND TESTING.—To really test the hardness of the surface of metal, we must take a new or at least a good, dead smooth file and apply one corner of it to a corner rather than on a flat surface of the metal to be tested, pressing the file very firmly against the work. A coarse file, even if a new one, is useless to test with. The greatest degree of hardness is obtained by plunging the red-hot steel into mercury. Steel hardened from the surface inward is hardest on the surface, while in steel that has been tempered the exterior is the softest. In the one case because the surface was cooled in advance, in the other because it was heated in advance. Files are hardened in the following mixture: 2 parts (by weight) of salt, 15 parts of rye grist, and 30 parts of burnt cow hoofs, all ground together and mixed with a sufficient quantity of water to make a pasty mass, with which the files are covered. When dry, they are placed in a fire. If, during the heating, the coating should drop off at certain places, the files are promptly withdrawn and the place exposed is covered with dry hoof powder. It is returned to the fire, where it is left until a temperature is reached which best suits the steel of which it is made. Then the file is plunged vertically into the bath, care being taken not to move them to the right or left, as they would cause warping. The bath is made in the following manner: 28 parts of salt are dissolved in about 5 parts of water, to which a handful of iron scale is added. The tongs are softened by being plunged into red-hot lead.

LIME has never been found in a native state; it is always united to an acid, as to the carbonic in chalk. By subjecting chalk or limestone to a red heat it is freed from the acid, and the lime is left in a state of purity.

A Little Disatisfaction.

During the Exhibition a number of protests have been filed against the award of the Jurors. At a recent meeting of the Board of Commissioners the following communications were received:

CINCINNATI, June 19, 1880.

To the Hon. Board of Commissioners of the Millers' International Exposition:

We, the undersigned competitors for Premium No. 82, Best Middlings Mill, beg leave to present to the Board of Commissioners of the Millers' International Exhibition the following narration of facts and accompanying protest:

Nordyke, Marmon & Co., to whom the above mentioned premium was awarded, entered for competition for this premium one 20-inch under runner middlings mill and no other.

When the judges came round to decide to whom the award for the premium should be given, Nordyke Marmon & Co. showed them a large upper runner mill which was simply on exhibition and had never been entered for competition, and to this the premium was awarded.

Hence we have the anomalous state of things, that one mill bears the entry ticket and another, entered simply for exhibition, the premium card.

Therefore we do respectfully and most earnestly protest against the award, and ask that it be reconsidered, and that it be given to that one of the machines entered for this premium which the judges shall deem best entitled thereto. We have the honor to remain, yours very respectfully,

KNOWLTON & DOLAN,
RICHMOND CITY MILL WORKS,
CURRIER MILL MACHINERY CO.,
JONES, BALLARD & BALLARD,
A. N. WOLF,
MUNSON BROS.

The following resolution concerning the above communication was passed:

Resolved, That the communication from Messrs. Knowlton & Dolan and other exhibitors be referred to the Executive Committee of the Millers' National Association, through Mr. Mills, the Assistant Secretary, with a request that instructions be given to this Board as to what action shall be taken in the matter.

Also the following was received and referred to Mr. F. B. Mills, Assistant Secretary of the Millers' National Association:

GREENPOINT, Brooklyn, N. Y., June 15, 1880.

Geo. E. Gault, Esq., President Millers' International Exhibition, Cincinnati.

DEAR SIR—I went to great expense to make an exhibit of the Duc Elevator Buckets at your Exhibition, that should be an honor to your Exhibition and a credit to ourself. I did this expecting that if a premium was awarded a few tests would be made.

After getting my exhibit in proper shape, I returned home, leaving instructions with my representative to notify me when the judges would be ready, and a telegram would bring me on. Not hearing further about the matter and apprehending the time was near, if any test was to be made, I telegraphed yesterday and got the following answer:

"Have not seen a judge. They awarded premium yesterday to Salem Cup."

This is so manifestly unfair that I appeal to you to investigate the matter. There should have been a proper test ordered in various kinds of materials, at different rates of speed; where, in all previous tests, there is no doubt but that the Duc bucket would give any other spherical bucket a sharp rub, and leave the square buckets all in the dark. The Salem bucket is a semi-spherical bucket and an infringement of our patent, hence is the last that should be awarded a premium against us. I regret that my engagements prevented my remaining over in Cincinnati. I was assured that the honor and integrity of the Association assured justice on all sides and feeling satisfied of this I left matters as I did. Yours respectfully, BENJ. R. WESTNER.

SOME of the American milling journals appear to be of opinion that milling "missionaries," like G. T. Smith and others, who have introduced and are still introducing into the U. K., American flour, and the modes of American milling, are acting prejudically to the interests of their own country, and that English millers, with this newly acquired knowledge of American milling, will be able to manufacture for themselves brands of flour equal to the finest in America. Although the possibility is very remote of exports of the manufactured article superseding in any very material degree those of the raw material from America, it is quite plain that there is plenty of room for fair imports into the U. K., and so long as the Americans can undersell, to any extent the English millers, there will naturally always be a market for American flour. That flour will ever entirely take the place of wheat as an article of export from America, we cannot conceive, although there are some sanguine American millers to be found who are of opinion that there is a contingency far from impossible, and not very remote. — *Corn Trade Journal (London).*

The Christiana Machine Company, of Christiana, Pa., are making a 54-inch Burnham turbine for the Dunn Edge Tool Company, Waterville, Me.

Geo. E. Gault, Esq.

We present to our readers in this issue a very good portrait of Geo. E. Gault, Esq., President of the Board of Commissioners of the First Millers' International Exhibition, Mr. Gault is a young man 36 years of age, and the young ladies will be glad to learn is unmarried. He is a Cincinnatian by birth and is a graduate of her schools. He entered the military service during the late "onpleasantness, and served until the war was over. After the war he became interested in the peaceful pursuit of manufacturing milling machinery, and is now one of the well-known firm of Simpson & Gault (the Straub Mill Co.), of Cincinnati, O. When the Millers' Exhibition was inaugurated Mr. Gault was elected to the Presidency of the Commissioners for properly conducting it. Any one who knows about such enterprises can easily understand that his position was a most difficult and laborious one. The Exhibition has proved a success more complete, in fact, than the most sanguine had hoped for, and from personal observation we know that very much is due to the untiring efforts and ability of Mr. Gault. In religion, like Hon. George Bain, President of the Millers' National Association, Mr. Gault is a strict Presbyterian, and would not consent to keeping the Exhibition open on Sundays.

GEO. E. GAULT,

Prest. Board of Commissioners, Millers' International Exhibition.

Any friend or intimate acquaintance could not say less, and would desire to say more in Mr. Gault's favor; a technical journal, not given to biographical sketches can say no more.

National Association Proceedings.

REPORT OF COMMITTEE ON MILL MACHINERY.

Mr. President and Gentlemen of the Convention:

At the last Annual Convention of the Association, held in Chicago in May, 1879, there was passed a resolution as follows:

Resolved, That the Committee on Mill Machinery to be appointed for the ensuing year be instructed to make an effort to obtain full information concerning any valuable improvements in any branch of mill machinery, and report in detail to the next convention, and that the members of this convention are earnestly recommended to give this committee all possible assistance by informing them of the exact result of any successful experiments that may come under their observation.

The members of this committee personally have done all in their power to carry out these instructions, but the members of the Association have done very little to aid them in their report.

MILL MACHINERY.

On this subject, we must say, lies more importance to this fraternity than in any other subject that may be brought before this convention, and we will herein give to this assembly such facts and points as we, in our opinion, think that is best for all concerned.

To begin the construction of a mill, the first and most important step is to get the proper size of your mill building. This it is not our place to suggest, but by all means consult some practical millwright who thoroughly understands his business, and have him make the plans for your mill-house, and see that it will be so arranged that there will be an abundance of room for such machinery as you wish to put into it.

Your mill-house done, your first important machine to look after is the power that is to drive your machinery. If steam power, you should be very careful in selecting such an engine as will give you the best results with the least amount of fuel. To bring about these results we would recommend the automatic cut-off engines, of which kinds there are now quite a number of them manufactured, all of which will be made familiar to you at this exposition. To those who are using the common slide-valve engines we would recommend that, if it is possible for them to make any changes about their engines, then see to it that your engine has a piston speed of not less than 600 feet per minute. This speed may seem to some of you to be very fast, but you will find that an engine traveling at this speed will do its work easier, run smoother and consume less fuel than one that runs slower. This matter has been fully tested, and has proved itself correct.

MILLSTONES.

Your millstones are, generally speaking, the first important machines (if so they may be called) that are requisite to put in a mill, and in their selection there cannot be too much care taken, for in the millstone lies the foundation of the flour manufacturing business, and if your stones are not right then your manufactured product is sure to be wrong. But as there is a system for all things, so must there be a system for the millstone.

In an opinion we would say that in selecting your stones get them of an even temper and grit, etc. If possible, have all the blocks to run from eye to skirt, and all joints made close.

About the dress that is best to put into stone is a matter that many millers differ in, and many experiments have been made which have proven failures, The great puzzle is how to obtain the most middlings out of the wheat. We have no particular dress to recommend, as there is none that has been yet tried upon which millers would agree. Some still cling to the old quarter dress, three furrows to the quarter, while others think best to have as many furrows as they can possibly get in. We have heard of 109 furrows in a 4-foot stone, and with this dress claim to produce 50 per cent. of middlings. While we also know of mills using the old three-quarter dress and claiming the same results, To put the stone in proper condition to grind the grain this requires not only the labor of a skilled workman, but also a method by which you will obtain a perfect face, and when done will enable you to make good flour, sharp middlings and broad bran.

How to get this result is a matter that has puzzled the minds of many millers and mill owners, but it resolves itself to the simple fact that if your millstone is not in proper shape you will never do good work. The question now arises, by what plan will you overcome this vexed question? Our recommendation is, first, see that your proof staff is correct, then prove your paint staff. But here arises the difficulty, and just here is the root of all evils. That a proof staff may be made to paint a stone wrong as well as right is a question upon which all millers will agree. Even the circular iron staff is liable to do this, and much more so the old wooden paint-staff that has been our guide for so many centuries past. Under this head I would ask you to grant me the privilege of making a recommendation, and will further say that it is not my purpose to advertise any person's machine, but when we have been convinced by actual experiment and trial of the good qualities of any particular machine, then we feel it a duty to recommend it to this convention. This machine is the staff lately invented by a Mr. Lehman, of Milwaukee, Wis. By this staff, and his method of using and applying it, there is no doubt but that the face of a millstone can be brought to perfection, and that by using it you will not cut up your bran so fine as to destroy your middlings and discolor your flour. For further information we would ask you to give it a close inspection, as we believe it is now here in this building on exhibition.

WHEAT-CLEANING MACHINES.

A careful selection of wheat-cleaning machines is an important matter for every manufacturer of flour. Should your cleaning machinery be defective, and your wheat badly cleaned, then you will certainly find your product to have a dark color. To commence the cleaning of wheat you should, first of all, run it over a separator, by which you can take out all the straw, sticks and dust. Then it should be run over a machine that will take out the cockle and other like impurities in wheat. These cockle machines should also have a sieve and suction to them, for you cannot clean your wheat too well and too often. This done, you should have a scouring machine, but in selecting it be very careful not to get such a one as will, in the process of cleaning, break the wheat or tear the bran. Your wheat being scoured, you should then put it through a brush machine, whereby the wheat should be relieved of all adhering impurities, dust, etc., as should have escaped the former machines.

BOLTING.

The bolting, or flour dressing machinery for a mill should be gotten up and constructed with great care. While it is of simple construction, it, at the same time, requires to be put up with great care, and by good workmen; and by all means do not use any other than the driest lumber. In the arrangement of the same, many improvements have been made in the different machines used in the mills, but the system of bolting has been but little changed, and only in a few particulars. The one is by having your reels covered by graded sections of cloth. This is a simple and cheap improvement, and can be easily applied to any reel. The way of doing it is to divide your reel into as many sections as you think proper, by placing strips of wood from rib to rib until they reach around, which then divides your reels into sections. Then make up your cloth, each section to be of one number of cloth. By this means you are enabled to change any number or section of cloth without taking off the cloth from the whole reel. Besides, the reel will be much stiffer, and not as liable to twist as it would be were these cross-strips not in. There should also be two conveyors under each reel, the one to convey the flour, the other the product not good enough for flour, and to be taken to the succeeding reel for rebolting. There has been gotten up of late the bolting cloth whippers and knockers. These, we have reason to believe, are a good invention, and easily to be applied to any reel. In the rebolting of flour they are especially good, as also on reels on which you bolt your low grades of flour. There are also several improvements on the construction of reels for bolting flour, but as we have had no experience with them, and no reports from any one that has used them, consequently can not give you any description or recommendation of them.

On speaking of bolting we would conclude by saying that it is a very difficult matter for the committee to say or recommend to you anything concerning the numbers of cloth to use or how to arrange them, as this is a matter that should be done by your miller, or the millwright which you have in your employ. And then you will find that you will be compelled to make changes in your cloth, for there is often something wrong in the arrangement of it.

CLEANING BRAN.

There has been, in the last two or three years, several different machines built for the cleaning of bran. One by Jonathan Mills, of Chicago, and one by Messrs. Lawton & Arndt, of De Pere, Wis. Both of these machines

have made a great many friends, and a great many mills are using them. The grooved rollers are also taking a conspicuous place in mills for the cleaning of bran, and have been reported to us as a success, doing the work well and with good results. These machines will all, no doubt, be on exhibition in this building, and we would ask that every miller present give them a close inspection.

PURIFIERS.

The purifier is at this time, in milling, considered an indispensable machine for successful milling, and without it a mill is incomplete. This machine is what may be called the machine that revolutionized milling, for what could be done to-day, at "high grinding," were it not for purifiers. The kind of purifiers that we would recommend for general use are the vibrating sieve machines, with a suction above the sieve, and a brush or blast below it. The reason we recommend these machines is that because they are simple in construction, easily handled, and less liable to get out of order than most other kinds. Since the introduction of purifiers into mills there has been many kinds put into the market, some of which work by a suction only, and using no cloth, others that are made with a reel in them with suction attached, others with a reel and sieve below it, others again with a sieve that has a reciprocating motion, but with all these improvements in purifiers, the machine that has proved the most successful is the one with the vibrating sieve, with a traveling brush or air blast under the sieve. To purify middlings successfully there should always be more than one machine, for you cannot successfully clean them unless you separate them according to size, and have each machine work on each separate size. Then you can give such suction to your machines as will clean them properly, and make less waste than if you run the whole of them on one machine.

GRADUAL REDUCTION.

This system of milling is now claiming the attention of millers generally, and is produced by several systems. One is the invention of Mr. Jonathan Mills, of Chicago, Ill. The other is by the using of corrugated iron rollers. This system of milling is now fast gaining favor, and it is very evident to this committee that the time is fast approaching when this system shall be more generally used than it is at this date, and we would call the attention of millers here present to make a careful examination of these two systems, as they are both on exhibition in this building.

WHEAT HEATERS.

These machines are now taking a prominent part among the machinery of mills, and we must say that they are considered by those using them as indispensable, especially in cold and frosty weather, for with them you can so regulate the condition of your wheat as to prevent the pulverizing of your bran, which is so detrimental to the making of flour during the winter months. These machines are also here on exhibition, and can be seen by all of you.

THE DIAMOND STONE-DRESSER.

Those machines are also in use in many mills to substitute the pick, and we believe their work is in many instances satisfactory, but this committee do not wish to take the liberty of making any recommendations, as the opinions are very varied as to their utility.

Under this head we may also make mention of the emery wheel dressing or facing machine, This, like the diamond dresser, has its friends as well as its enemies; therefore, we leave this matter to your personal investigation, which can also be done at this exhibition.

In conclusion, we would here state that we would have very much preferred to have reported on all the improvements made heretofore that are not included in this report. There are machines that are used in milling, and there are improvements made daily which are considered by the inventor of small importance, which, through the jealousy of others, are not spoken of to any one, and which, if reported at our convention, would receive the approbation of all its members, and probably be so great a help to the erring ones as to at once help them out of the difficulties under which they have been for a long time laboring. This feeling should not exist among us; on the contrary, we should endeavor to help one another; for are not we a mutual band that have come together to help and work for one another's benefit and protection, and should we not consider it a pride to give such information as we should be pleased to receive? Therefore let the same resolution that was passed at our last regular meeting at Chicago be adopted again; and we would ask that every member of the Association observe it and make such report to the committee on mill machinery, as in his opinion the machine which he has tried or heard of deserves, be it good or bad. If the machine so tried proves to be worthless, is it not best that every one should know it? Has there not been thousands of dollars spent by the mills in the last decade for machines that have not been successful. We hope you will now fully appreciate our desire, and see that it is mostly for your advantage that you should carry out the full interests and purposes of this resolution. And that the committee that supersedes ours shall be better enabled to give you a better and fuller report than it has been our privilege to do.

The report was accepted, and President Bain appointed, in accordance with its recommendation, the same committee on milling machinery as last year, consisting of N. Elles, chairman, Evansville, Ind.; Robert Tyson, Baltimore, Md., Homer Baldwin, Youngstown, O., D. E. Roberts, Maysville, Ky., J. F. Woodbury, Marshalltown, Iowa.

A Gigantic Land-Grab

[Titusville, Pennsylvania, dispatch.]

The first issue of the *Petroleum World*, the oil-producers' new paper, will to-morrow morning publish the details of the Standard Oil Company's latest conception in the way of monopoly, which appears to be a movement on the part of the Standard to get control of the wheat markets of the world. This information is now given to the public for the first time. During the past few months the Standard has had agents through the northwest buying lands principally in Minnesota, for which in every instance cash has been paid. None but the best wheat lands are being taken. These purchases have already amounted to 40,000 acres in Minnesota alone. Two weeks ago a man was sent quietly from Pittsburg to superintend a large portion of this land. Of the 40,000 acres, 20,000 will be broken up and cultivated in wheat this year. Purchasing agents are still in the northwest, and the work of gobbling lands continues. The purchasing committee travels in a special car, and when they encounter a tract of land that suits them, it is at once absorbed. Much of the property is in the shape of land-grants to railroads. It is the intention of the Standard to possess a million of acres of the choicest wheat lands in the West before another year. The chances are that they will have this enormous quantity inside of six months, as the work of buying is carried on in the most princely manner. Whole townships and counties are passing in blocks into the hands of the Standard. It is said to be the most gigantic land speculation that any country has ever known, and yet so secretly has it been carried on that nobody outside of the giant oil monopoly knew of it until 40,000 acres had been gobbled up. These enormous purchases are being made from the profits of the Standard's oil business, a large percentage of which comes in the shape of rebates from railroads. None of the capital stock of the company is being tied up in this land grab. Discussing the big speculation, a railroad man says: "In this, railroad managers can see some of the results of permitting a corporation like the Standard Oil Company to exact drawbacks and rebates on shipments." Aside from rebates on freights, a large portion of the Standard's profits comes from their manipulation of the oil markets. These are but two of the sources whence the monopoly can draw from the capital they are now investing in these western lands. A corporation that can increase its assets to $22,000,000 in ten years on a capital of $1,000,000, control legislatures and the three great trunk lines of the country, is probably not pressed for funds. The opinion obtains among those who are cognizant of this move of the Standard that the object is to get control of the wheat market as they now control the oil market. They will be large producers of wheat, and, if necessary, large buyers as well. It is thought their power over the railroads as shown in the transportation of oil, will enable the Standard to say to the world just how much it will pay them for its daily bread.

Treague & Wilkinson, Greenville, Ala., are improving their mill, and the Christiana Machine Company, Christiana, Pa., are supplying them with a 27-inch Burnham turbine wheel and the necessary machinery.

John F. Backensto, of Albany, Oregon, sells a great many of Burnham's standard turbine in the Northwest. The Christiana Machine Company, Christiana, Pa., has just shipped him two 36-inch and two 18-inch wheels.

The Chemistry of Bread Making.

CANTOR LECTURES, BY PROF. GRAHAM, D. SC., LONDON, ENGLAND.

Continued from May number.

At last we have got our loaf in the oven, and it will remain in the oven about an hour and a half. While it is in there, I propose, in the first place, to consider some peculiarities in ovens, and then to discuss that part of the subject which comes most within my province, namely the chemical changes produced by the action of heat on the loaf. In the common oven, in former times, and even yet to some extent abroad, the heat was obtained by burning wood inside the oven; that is to say, in that part of the oven in which the bread was afterwards placed. When the combustion of the wood had communicated a sufficient amount of heat to the walls of the oven, then the embers were taken out and the bread was put in. This is manifestly a rather cumbersome method, and I need hardly say, in a country like ours, is also an expensive one. Consequently, even long ago, coal was employed for the purpose of heating the oven, the coal being used in external furnaces. The Vienna baker, who certainly for many long years has been pre-eminently the best baker in Europe, and from whom the Parisian has learned much, years ago found out that steam, acting on the moist surface of the loaf, was able, at a high temperature of the oven, to convert the starchy matter of the surface, moistened, as I said before, with water, into dextrin; in other words, by the action of heat and moisture, he found that he convert starch into dextrin in much the same way that the greater part of the dextrin, which is now used in calico printing, or at the back of postage stamps, is also made. The Vienna baker obtains the steam in this way. The first batch of bread is common bread, or rather an inferior character, and of course the oven is charged with the moisture of the steam which comes from the bread. After that the rolls, moistened on the surface with water, being placed in the oven, the steam from the first batch of bread causes this glazing of the surface. Of late years the Parisian bakers have employed steam boilers, so that an injection of steam, from a boiler working under a little pressure, takes place into the oven, and such ovens, though they are not common, can be found in several places in London. I have a drawing here of an oven which will give you an idea of the character of the operation that goes on. The centre drawing represents the front of the oven as you see it with the door for the admission of bread, and a door underneath for warming up rolls and loaves previous to their introduction into the oven. On the side is the boiler with the steam gauge. You will notice the drawing has two lines indicat- an intersection at A B and C D. The drawing on the left is the section at A B, and shows the interior of the oven. The door is partially open, and there is a pipe at the side, with small apertures for the purpose of charging the oven with steam. You will notice that the floor of the oven is not horizontal, but rises slightly, the object being that when the door is opened the steam shall not fall out. Being heated it is lighter than air, and if there is a slight incline given to the floor of the oven the tendency of the steam is to keep in; whereas, if it is flat, there is a tendency for a considerable quantity of steam to pass out every time the door is opened and shut. The other drawing represents a section on the line C. D., which indicates, by means of a moveable door, the way in which the flame coming from the furnace is sent into the oven to heat its stone walls. So soon as the oven has arrived at the temperature of about 400° to 450°, it is closed. In the bakeries of Mr. Bonthron, of Regent street, and Mr. Carl Fleck, of the Brompton Road, a plan is adopted of having two ovens, but I know that besides these there are some other bakers in London who also adopt this injection method, which practically, in its first conception, was due to the Austrian baker.

In addition to this system, of baking bread by means of fuel, steam has also been employed in other processes; what is called Nevil's bread, which has a considerable sale in London, I understand, is baked by means of steam at a high temperature. You doubtless know the character of that bread sufficiently well, and it is, therefore, not necessary that I should further allude to it.

I will pass on now to the chemical examination of the changes which take place when the bread is introduced into the oven. In the first place, the bottom of the loaf, and the side and the top of the loaf are greatly heated by the hot surface which comes in contact with the bottom, and by the hot surfaces which radiate the heat from the top of the oven on to the loaf. You will notice, in looking at the drawing, that the depth of the oven is comparatively slight, the object being to have the radiating surface as near as possible to the top of the loaf. So soon as the loaf has been submitted to the action of the heat, the carbonic acid gas which was in the dough expands, and by the time that has been heated from about 80° to 212°, which is the boiling point of water, that gas will have expanded from one cubic inch to 1.24, and that will indicate the amount of increase that a loaf would undergo, supposing there was no moisture. But while that amount of increase takes place, due to the expansion of the carbonic acid gas itself, there is also considerable expansion due to the fact that the gas is moist. Now, the tension of aqueous vapor at 212° is equal to the atmospheric pressure, and therefore we get an enormous increase, due to the amount of the moisture as well as to the carbonic acid gas itself. I said just now that the temperature of the oven ranged from about 400° to 450°. The temperature of boiling water is 212°, that is to say, provided the barometer stands at 30 inches of mercury, because, of course, there is a higher boiling point if the barometer be higher, and lower if the barometer should stand lower. Therefore, although the walls of the ovens are at a temperature of about 400° to 450°, the loaf itself is not at such a temperature. The bottom, which is resting on the hot surface, of course is considerably heated, but the interior of the loaf does not rise much above 212°. It rises doubtless slightly above that temperature, due to the resisting action of the outer surface of the crust, which adds to the resistance of the atmospheric pressure. Secondly, during this action which is going on in the presence of moisture, the cell walls of the starch are ruptured, so that we obtain from such a heating action, not starch such as we know it before it is boiled, but starch which, by the ruptured cells, lends itself readily to to the action of albuminoid ferments. Thirdly, by the action of heat some of the albuminous matter undergoes a degrading action, which is afterwards of use in the digestion process. But that is not all. Due to the action of heat and moisture, not only is there glazing by the production of dextrin on the surface, but there is also, to a slight extent, a production of dextrin in the interior of the loaf. You all know that if you were to boil a suet dumpling, for example, for a comparatively short time, the suet dumpling would not be very remarkable for its digestibility. Indeed, as in a day or two the most favored festival of our year will be at hand, I am reminded, by this action of the heat upon the dumpling, of the old doggerel, which I should imagine was partly composed by youth and partly by the experience of old age. That doggerel says, "Plum pudding hot, plum pudding cold." That represents, to a great extent, the desire of youth to have plum pudding, no matter whether it be hot or cold, provided there be plenty of it. But then old age lays down this as a necessary condition, that the plum pudding should be "in the pot nine days old;" in other words, you cannot get digestible albuminoids and starch of wheat unless they have been submitted to the prolonged action of heat and moisture, and this, to some extent, takes place in the action of heat upon the loaf in the oven.

Another point I have to notice is, that colored products are formed. I have a table on the wall, prepared by Oudemans, showing the action of heat on malt, and you will see there that air-dried malt contains no torrefaction products, and that there are no less than 186 per cent. of albuminoid matters; whereas, when the malt is heated to a temperature less than boiling point, we get 14 per cent. of torrefaction products, and only 10.5 of albuminous matter. The torrefaction or colored products that are formed, are partly due to the action of moisture at a high temperature on soluble albuminoid matters, and partly to the dextrine and maltose sugars that have been formed in the previous panification process. Now, the soluble products are obtained in the previous process of bread-making, the greater will be the amount of color in the final loaf. On the other hand, the less the soluble products produced by the previous bread-making process, the less will be the colored products contained in the oven. That is why inferior flours produce so much color. Inferior flours, as I have pointed them out to you from the tables drawn up by Mr. Brown, yield to the panification process, that is, in the process where moist and moderate heat is acting on flour for a considerable time, a very large

quantity of soluble products are formed. Therefore I say that the more soluble products obtained in the previous panification process, the greater the amount of colored products obtained in the oven, and of course the less pleasant does the loaf look.

Another matter we ought to notice is, that by the action of heat we obtain the outside crust. This crust retains the moisture for a much longer time than if there were no crust and, lastly, the amount of moisture or water is greater the finer the flour, and, of course, *vice versa*, and this absorption and retention of water depends upon two distinct factors. In the first place, it depends upon the higher character of the albuminoids. Albuminoids of high maturation character (such as the crude gluten, which, you will remember, I told you was composed chiefly of fibrin, and, to some extent, also of glutin) absorb and retain water with great avidity, which is not the case with some other forms of albuminoids, such as albumin found in most cereals, largely in our inferior wheat in bad seasons, but to a very small extent in really well-matured wheats grown in highly favoured climates; the legumin and other soluble albuminoid bodies, found very largely in the *leguminosæ*; and the cerealin, which is one of the aluminoids found in the husks of cereals—of wheat especially—these soluble albuminoids do not absorb much water, nor have they much power in retaining it. Therefore, I say, that the first factor depends upon the character of the albuminoids present. But there is still another, which is this, it depends also on the percentage of starch. Supposing you have a sufficiently large quantity of the hard gluten, then the higher the amount of starch, the more water will be absorbed and retained by such flour.

This absorption and retention of water enters largely into the question of the number of loaves that may be obtained from 100 lbs. of flour. The baker, of course, reckons by the sack, but it is more convenient to take a percentage result. According to Lawes and Gilbert, in 100 lbs. of bread, there will be on the average 62.8 of dry solid matter, and 37.2 of water; according to Milton, 63.7 of dry matter, and 36.3 of water; according to Dumas, 55.4 of dry matter, and 44.6 of water; and according to Maclagan, who made a series of researches on this matter, the average amount of dry matter was 64, and of water 36. From a number of results supplied to me by bakers, I find the average agees pretty well with the statements of Lawes and Gilbert. To take this question from another point of view, 100 lbs. of flour will yield, according to Lawes and Gilbert, 135 lbs. of bread; according to Dumas, 130; and Maclagan, 137.7. But I need hardly say that the number of loaves obtained from 100 lbs. of wheat flour, or the number of loaves obtained from the sack, will, of course, vary according to the character of wheat. Practically, the finer the wheat, the greater number of loaves obtained from it. It may be of interest—not to those practically acquainted with the matter, but to those who are not—to say that the number of loaves obtained from a sack of flour will vary—I am afraid, in a year like this with English wheats, the result would be rather low; but, taking more favoured circumstances, it will vary—from 90 to 95; possibly, with exceedingly fine foreign wheats, more than the latter number may be obtained.

I have now done with the fermentation process, by which carbonic acid gas (I have said very little about the alcohol which is produced, as I pointed out, along with carbonic acid gas in the fermentation process) is used for the purpose of lightening the bread. I have now to refer briefly to what may be called artificial processes of producing the same evolution of carbonic acid gas, not from the flour, but from chemical substances used along with the flour. The best known of these methods is the process of Dauglish, which is still practiced in London, and it may be in some other large towns of England. The carbonic acid gas in this method is obtained by the action of acid upon chalk, that is, carbonate of lime. The carbonic acid obtained by the decomposition of chalk is thoroughly well washed, and the carbonic acid and water are then mixed, in proper proportions, with the flour, and, as rapidly as possible, the dough is made, scaled, made up into loaves, and put into the oven. Now, the advantages of these artificial processes are manifest. An inferior flour is not submitted to the degrading action of the albuminoids upon the starch; we obtain no sugars, we obtain no dextrin. In other words, no action takes place except in the oven, and, therefore, one is able to employ inferior flours by such an artificial process. I referred to this process at our last meeting, and a gentleman asked me at the end of the lecture whether I meant that those who employed the Dauglish process used inferior flours. Of course I did not say that, nor do I say it now. I merely say that one of the advantages of the invention or suggestion of Dr. Dauglish is, that we *can* make use of inferior flours. Another advantage is, that the process is a very rapid one. The whole making of bread occupies a very small period of time compared with the long, tedious, laborious operations of the ordinary fermentation plan. On the other hand, I think I am bound to mention (though this is not so much a scientific matter as one of personal opinion) what I consider the disadvantage of the process. Such a bread is manifestly less sweet than if the flour had been subjected to the fermentation process. There has been no dextrine, no sugar formed, and the albuminoids have not been lowered or degraded. Consequently, such a bread does not taste sweet; it has none of that nutty flavor, according to my taste, which a well-fermented good loaf has; and it seems to me that many other people at least must have adopted the same opinion, because it is long since Dr. Dauglish proposed this method, which theoretically seems a very excellent one, and yet, I think I am not very wrong in saying that, if we consider Europe, we shall find a remarkably small portion of the flour of Europe is submitted to the Dauglish method, compared to the vast amount of bread made by the fermentation process; and if the bread has been so well thought of by the world at large, it ought by this time to have progressed much more than it has. Another objection which occurs to me here is this, that the bread cannot be so rapidly digested as the fermented bread; and it would be desirable that investigation should be made upon this point, because one cannot help feeling interested in the Dauglish process, on account of certain obvious merits which it has.

Other methods for producing artificial raising of bread are very numerous, and I need only name two or three of them. In the first place, there is the process by which bicarbonate of soda and hydrochloric or muriatic acid, are brought to act on each other in the dough. A reaction takes place, by which chloride of sodium, or common salt, is formed, and the carbonic acid escapes, and, therefore, raises the loaf. But it is necessary that the operation should be carried on very rapidly, and it is also necessary that the exact proportions of bicarbonate of acid and hydrochloric acid should be used so there should be an exact neutralization of one by the other. In addition to this method, tartaric acid and bicarbonate of soda are employed occasionally; and sometimes hydrochloric acid to which a small quantity of the acid of phosphate of lime has been added, is also employed, along with the bicarbonate of soda. It is very easy to make this acid phosphateof lime. If you take a small portion of burnt bones, called bone ash, which comes so largely from the River Plate and the Rio Grande of South America, and add to it hydrochloric acid, you convert it into what is technically termed superphosphate of lime, or acid phosphate of lime, and if you use an excess of hydrochloric acid, you will have a solution of acid phosphate of lime in the hydrochloric acid liquid, and this if it be used to react on the bicarbonate of soda, will give common salt, together with phosphate of lime. The use of such agents has been recommended by many, owing to the desire, especially in the case of poor children, ill supplied with milk, that the bread should contain bone earth, or the elements of bone earth, so that the children may obtain a considerable quantity of phosphate for the purpose of building up their bone tissues which, at an early age, is so necessary. Bicarbonate of ammonia has also been employed as an artificial method of raising bread, and, of course, there are many other artificial chemical means. The various baking powders which are so much advertised, depend on a reaction of this kind by which carbonic acid gas is employed artificially. They all of them seem to me to be open to the same objection as the Dauglish method, and they have not its advantages except in so far that they enable one to make an aerated bread under certain unfavorable circumstances, such as at sea, or far away from the means of obtaining yeast; of course, under these conditions, they have some value.

To be Continued.

Isaac Mattis, of Elizabethville, Pa., is improving his mill and putting in a 30-inch Burnham turbine wheel, and machinery made by the Christiana Machine Company, Christiana, Pa.

From Germany and Austria.

The following items are translated from our German and Austrian milling exchanges especially for the United States Miller, and other papers copying any of them are kindly requested to give due credit.

MEAT BREAD BY MR. SCHEURER-KESTNER.—An invention having the merit of originality is the meat bread, invented by Mr. Scheurer-Kestner. When we eat we take the trouble to digest our bread and our meat separately. The inventor has conceived the idea to do away with this double labor. Mr. Scheurer-Kestner has discovered the means of assimilating the meat to bread beforehand and thereby saving the stomach the trouble of doing it. And then how much simpler will it be to provide only bread instead of being obliged to furnish beefsteak, cutlets, etc. The method will be of great importance for the soldier in the field as well as for the hunter, the traveler etc.

Mr. Scheurer-Kestner has discovered the very remarkable fact, that during the preparation of bread a peculiar fermentation took place, which brings about an absolute, complete digestion of the meat; beefstaak, cut into pieces and mixed with flour and leaven, will disappear entirely during the preparation of bread. Its nutritious components dissolve, become one with the bread, and the meat which is so liable to become putrid, can be conserved for an indefinite time in this new form. The son of Mr. Scheurer-Kestner has laid loaves of bread prepared since 1873 before the Academy, which are yet excellent and do not show any trace of either mould or worms. In the beginning the inventor used raw meat; but the meat bread thus obtained has a slightly sour taste which is disagreeable. Mr. Scheurer-Kestner has avoided this evil by first cooking the meat for one hour with such a quantity of water as is necessary to moisten the flour. Salt pork may be advantageously substituted for a quantity of beef. It is advisable in all cases not to go beyond the proportion of 50 of meat to 100 of flour, as the digestion will then not take place completely.

To speak the truth, the meat bread which Mr. de Parville tasted at the Academy, and which has been prepared last June, has a very good appearance, but has nothing that could excite our appetite. A good, savory piece of roast meat will always suit a weak stomach much better. In exceptional cases, however, and principally for the preparation of nutritious soup, it seems to us well suited to be of great service. It suffices to cut up this bread into slices to let 80 grams of it boil for 20 minutes in a litre of water, and then to salt it sufficiently to obtain a very rich soup.

This meat bread was sent to Gen. Chanzy in 1873 to try its use in the army; but since this time the manner of manufacturing it has been very much perfected. The addition of pork has made the bread more palatable; the son of Mr. Scheurer Kestner maintains that even when veal is used in the preparation of the bread, it will furnish excellent broth for the use of the sick or the wounded.

It seems to us desirable, that the meat bread of Mr. Scheurer-Kestner should become popular. In time of war it may be used advantageously for the army, during sieges, and at all times by sailors and explorers; it could even be used for medical purposes.—*Le Technologiste.*

ELECTRIC CONTROLLING APPARATUS FOR MILL-STONES, BY ANTON EMELE IN MITTELSTEINE.—The evil results occasioned when the stones are running without grain are sufficiently well-known, and we will therefore here refer only to the dullness of the stones and the emitting of sparks which result therefrom, the latter frequently causing the destruction of mills by fire. The only remedy used as yet, when anything was done all, consisted of an alarm or electric apparatus of the most primitive and unreliable kind, so that it is well worth while to point out the the advantages of an apparatus recently patented which meets the requirements of the case completely. It deserves recommendation the more, as it has been practically tried and meets with approval from all sides.

The apparatus consists chiefly of a bell placed in the mill-hopper and which, hanging on a scale-beam, is pressed down by the grain. The other end of the scale-beam projects through the side of the mill-hopper and bears a weight which draws the beam downwards as soon as the grain in the hopper has reached a certain level or does no longer cover the bell, and thereby closes the current of an electic apparatus which will cause an alarm to be sounded by a signal apparatus adjusted thereto, which indicates that it is time to supply the stones with grain.

When the material ground is heavy, as for instance, ores, lime, etc., this apparatus is placed directly into the funnel, so that only the end of the scale-beam with its counterweight projects. On account of the weight of the material ground it is advisable to place the apparatus as low down into the funnel as possible; for this purpose the latter will have an opening on the side. 10–15 cm. in length, so as to give ample room to the scale-beam. When grinding grain, the apparatus can hang above the mill-hopper, but in fastening it, it is necessary so to arrange it that the scale-beam moves in a vertical plane.

The electric battery above spoken of consists of three elements, which supply power enough to control the runs of a large milling establishment.

Many millers are of the opinion that any signal apparatus, whatever it may be, only serves to make the workmen negligent and relie too much on the signal. The inventor of this apparatus is decidedly opposed to the view, proving his opinion by putting the question whether it is better to have a signal in the mill and the office, or in the sleeping apartment of the miller, whereby every impending danger may be prevented, or to have no signal, whereby damage amounting to thousands may occur, nothwithstanding the fact that the workmen are careful and reliable. Viewed from this stand-point it is certain that a signal in the mill is decidedly advantageous. But in order to satisfy those millers who hold to the first mentioned argument, a scale or minimum indicator has been adjusted to the apparatus. As has been stated above the counter weight sinks down as soon as the grain in the hopper reaches a certain level, and at the same time that the counterweight falls, the indicator of the scale moves to the right and towards that notch of the scale where a new feeding of the stones is necessary; at the same time the apparatus sounds the alarm. In connection with this there is a control of the workmen in the mill, which is a double one if in the mill itself a signal apparatus is adjusted, which is decidedly the most advantageous.

The whole apparatus is very inexpensive in the first cost as well as in the working of it, and it may easily be adjusted by any miller.

This apparatus will certainly become very popular and its introduction into every mill is greatly to be recommended.—*Deutsche Mueller Zeitung.*

UNIVERSAL GRAIN CLEANSING MACHINE "EUROPA," BY OTTO BEHRLE, IN RENCHEN (BADEN). PATENTED IN GERMANY.—This grain-cleaning machine consists of a cleaner, scouring cylinder, brush cylinder, and "tarare" and combines these four machines as one in a space of not quite 4 qm. The grain is transferred from each of the four separate apparatus directly and without any intermediate factor to the next one.

The machine operates as follows: The grain is at first put on the cleaner, which is provided with three changeable seives, the upper one of which removes particles of earth, stones, wood, peas, in short, all such admixtures as are larger than the normal kernel of grain, while the middle sieve separates the grain, and the lowest one discards the dust, fine seeds, brome grass, small cockle and vetches, as also all admixtures of the grain which are smaller than the normal kernel. The grain which has passed over the second sieve is tranferred to an upright scouring cylinder, and in which, by means of the permanent action of suction, the germs, points and loose particles of husk are rubbed off by friction. This scouring cylinder is furnished with steel pieces covering the joints and a jacket of wire, which offers a very rough surface to the kernels, but without injuring them.

The distances between these pieces which cover the joints and the jacket can be enlarged or diminished, so that the action of the cylinder on the grain can be regulated. The grain is then transferred from the scouring cylinder to a conical brush cylinder, which will brush off the particles of husk loosened by the former, give lustre and smoothness to the grain and prepare it for the "tarare" to which it is then transferred. The "tarare," the construction of which is based upon a ring-like arrangement of the suction surface, and centrifugal feeding does in consequence of this offer a working surface to the current of air that produces the suction which, notwithstanding the small dimensions of the machine, amounts to 120 cm. in length by 4 cm. in width, and which renders a better and more careful action of the suction possible, since the feeding by means of the conveyor trough is a very regular one, and the power of the exhauster is applied directly. The force of the current of air can be regulated by means of two contrivances adjusted to the "tarare."

The "tarare" removes all admixtures from

the grain which are specifically higher than the normal kernel of grain. Among these are: Broken and dead kernels, husks, shells, chaff, dust, further, the germs and particles of fibre which may have become loosened by the scouring and brush cylinders, so that the grain when leaving the "tarare" is freed from all those admixtures which could exert a detrimental influence on the color and quality of the flour. The required power of the "Europa" is very small, according to the inventor, the small machine, with a capacity of from 600-800 kg. per hour, requires but 1½ horse-power, while the larger machine, with a capacity of from 1,000-1,200 kg. per hour requires only 2 horse-power.

The machine works noiselessly and occasions no dust, and can therefore be placed in any story of the mill where there is a free space of 4 cm. Since it is supplied with only two spindles, it needs but a very small quantity of material for lubricating purposes.—*Die Muehle.*

AN UNFORTUNATE MILL.—The following sad course of events is written from Trubaw, in Morwia: A little ways from the above-named place there stood a mill, in which Fate has ruled so mercilessly that an account of it might be of interest. In 1876 the owner of the mill at that time, on account of old age, gave up the management of it to his son Frank, whose term of military service had just expired. Frank married, but his wife was poor, and the debts which had been contracted during the management of the old man weighed heavily upon the young miller. When he finally became convinced that it would be impossible for him to meet his obligations, he was seized by despair. One day he was found in his granary with shattered brain; a shot from his gun, which had been loaded with water, had put an end to his unhappy life. The widow was now the sole proprietress of the mill. After some time she was again married, and it was an apparently very happy union, her husband being very kind-hearted, and, besides, was not destitute of means. He payed off the debts of the mill, added to the building and constantly endeavored to improve, enlarge and embellish the establishment. But their happiness was of only short duration. The good miller died in consequence of the negligent treatment of a cold, and a short time afterwards the scarlet fever bereft the mother of her only little son, leaving her again alone in the mill. In order to run the mill, which was now in the most flourishing condition, she was obliged to engage a journeyman miller who was well qualified in his trade. She was happy in finding such a one, and left the whole management of the mill to him. Vinzenz, the name of the new miller, was not without means, and soon conceived the idea that he was well liked by the widow, and the thought that he was going to become the future owner of the mill became uppermost in his mind. The widow, however, had no intention whatever of granting him that privilege, but had meanwhile become engaged to some one else, whom she was going to marry at the expiration of her year of widowhood. As soon as the miller became aware of this, he formed a terrible plan. He bought a revolver, and entering the room of the widow fired upon her three times. Upon the alarm given, help came, and Vinzenz fled. The widow was only slightly wounded, and soon recovered. Vinzenz surrendered himself to the the authorities, and his judgment has not yet been pronounced. A few weeks from that time the widow was to be married, when one night the mill was burnt to ashes. The widow escaped with her life, but money, clothing, furniture, as well as the supply of grain and flour were seized by the flames, and nothing is now remaining of the fatal mill but a heap of charred debris. — *Oesterreichisch Ungarische Mueller.*

CO-OPERATIVE BAKING SOCIETIES.—In Holland a new impulse has been given to baking and in formation of societies for this purpose. It appears that, of a number which were organized as a test on the co-operative plan, all report very encouraging dividends. One of the largest of these bakeries at Hague has just declared a divident of 16 per cent. At the same time it sold bread at two centimes per kilogram below Amsterdam, and four centimes below Rotterdam prices. One of the Amsterdam joint stock bakeries has also reported 12 per cent., and these co-operative institutions are everywhere on the continent flourishing. Co-operative stores in England are also proving successful, more so than in this country, because here the promoters of these institutions are more interested in making profits for themselves than in selling goods cheaply to the society's subscribers.

MILLERS' EXHIBITION.

A DEFICIT OF $20,000.

The Guaranters to be Assessed Thirty-three and One-third Per Cent.

GOODS UNDER THE HAMMER.

[*Cincinnati Commercial, June 26.*]

The Board of Commissioners of the Millers' International Exhibition met yesterday, at 3 o'clock p. m., with President Gault in the chair, the following members being present: Messrs. Simpson, Kinsey, Snodgrass, Huntington and Dayton.

The minutes of the last meeting were read and approved.

The following communications were read:

JUNE 26, 1880.

George E. Gault, Esq., President Board of Commissioners Millers' Exhibition, Cincinnati, Ohio.

DEAR SIR—We had planned to call on you before leaving your city and acknowledging in person the obligations under which your kindness and courtesy, beginning with the first opening of the Exhibition, and continuing through every day to its close, have placed us. Not having been able to do so, we take this means of expressing to you, and through you to your associates on the Board of Commissioners, our thanks for the splendid treatment we have received at your and their hands; and we also wish to place on record our high appreciation of the importance and value of the great Exhibition, which owes so much of its success to the untiring efforts of yourself and your fellow-workers.

Nothing of the kind approximating this in magnitute was never attempted before, and no other single industry or interest dare make a similar display. It has drawn visitors from nearly every country and city in the old world, and from every section of our own country, excepting, perhaps, Cincinnati.

Cincinnati, after having shown great spirit and enterprise in securing the location of the Exhibition, and great liberality in subscribing a guarrantee fund sufficiently large to put it on a safe basis financially, singularly enough has seemed to have taken little interest in the Exhibition itself. It was the universal expectation of exhibitors that the buildings would be thronged with city people, particularly at night, and it was a constant cause of surprise and remark that this was not the case.

The exhibition drew together within convenient space for comparison every important machine for the cleaning, handling and grinding of grain from all countries. Every process of reducing wheat into flour in successful practice in any part of the world was shown in operation. A book of surpassing interest and value might be written on the wheat exhibits alone.

These were from every quarter of the globe, grown on varieties of soil, and under all imaginable conditions of climate, temperature and tillage. A careful study of these grains would no doubt have revealed the fact that many of them might be profitably substituted in different sections of our own country for the varieties now grown, and it is to be regretted that some competent hand was not found to undertake this task. It would seem that such features as these should have furnished abundant attraction and entertainment for the practical and thoughtful portion of the community, and surely at night, when the great buildings were aflame with countless gas jets, and vocal with the hum and whirr of a thousand machines, mere sight-seers could nowhere hope to find a more inspiriting or blood-stirring scene. But whatever the reason may have been, that the exhibition did not "draw" at home, it was not any lack of merit in itself, or want of effort on the part of its managers.

We are sorry to learn that a call must be made on the guarantors to meet the expenses of the exhibition, but we feel sure Cincinnati has gained in many ways vastly more than she can lose through the trifling difference between your receipts and expenditures; and a city that was liberal enough to venture on so great and new an experiment, and intelligent enough to carry it to a successful conclusion, will not be slow to discover and profit by the advantages it has brought her, and whatever may be the present temper of her people toward the men who have borne the heat and burden of the day, she will soon gladly join in awarding them the praise and commendation they have so well deserved.

Again acknowledging the obligations we are under to you and to all officers of the exhibition, we are very truly yours,

GEO. T. SMITH PURIFIER CO.

BALTIMORE, MD., June 26, 1880.

George E. Gault, Esq., Cincinnati:

DEAR SIR—Having unfortunately missed you the other night when leaving, I feel that I cannot, nor ought not, leave you without sending you my warmest thanks for your kind attention to me during my stay at Cincinnati, and at your Exhibition. In a few days more I sail for Europe, and before leaving would ask you to have the kindness to tender my warmest thanks to various officers connected with the Exhibition.

I shall ever remember with feelings of much pleasure my visit to your country, and the warm hearts I have met here.

Yours faithfully, MAURICE GRANDY,
Liverpool, England.

HIGHLAND, ILL., June 27, 1880.

Mr. George E. Gault, President, Cincinnati, Ohio:

DEAR SIR—By this time the Exhibition is at an end, and I do hope you are satisfied with the result. All visitors I have spoken to are full of praise and admiration. The Illinois exhibit contained about twenty barrels of flour I turn over to the benefit of the Commissioners, if they will be kind enough to pay the small expense of shelving, etc.

The "Gradual Reduction Mill," invented in 1580, B. C., is a present to you individually.

Truly yours, C. H. SEYBT,
Secretary Illinois Millers' State Association.

CHICAGO, June 19, 1880.

James Gordon, Esq.:

MY DEAR SIR—In accordance with the unanimous vote of the British and Irish millers who have visited your Millers' International Exhibition at Cincinnati, I am requested to express through you (as the gentlemen delegated by the Commissioners of the Exposition to meet us on our arrival at New York) the hearty thanks of the party to President Gault and the Commissioners for their kind invitation to us to be present at the opening of the first Exhibition of its kind, and for the opportunity afforded us of seeing such a large and valuable collection of cereals, mill machinery and milling products. Our party will take it as a favor if you will also convey to the honorable President of the Cincinnati Chamber of Commerce, and to all other kind friends who have so greatly assisted in making our visit to your Queen City of the West so enjoyable. Believe me that the impressions made on our minds by the kindness and hospitality that we have received from all throughout our visit will not early be erased, but it will be a green spot that we shall often look back upon with the greatest of pleasure. In conclusion, allow me to wish you every success for your Exhibition. Believe me yours, very truly, THOS. I. LOFTHOUSE,
Hon. Secretary British and Irish Millers.

The following resolution was offered and unanimously adopted:

Resolved, That an assessment of 33⅓ per cent. be made upon the guarantee notes of the Millers' International Exhibition, to meet the outstanding indebtedness of the Board of Commissioners in charge of the Exhibition, said assessment to be paid at the Commercial National Bank of this city.

Meeting adjourned.

AUCTION SALE OF FLOUR AND GRAIN.

The flour and grain entered for competition at the Exhibition was sold at auction yesterday morning, in Floral Hall, Mr. H. C. Ezekiel, of the firm of Louis Rosin & Co., acting as auctioneer, under the direction of Mr. E. H. Huntington, Treasurer of the Board of Commissioners. The first lot offered was "Bain's" first premium barrel, which was knocked off, after a lively competition, to Mr. Gault, President of the Exhibition, for the sum of $50. A number of other barrels of flour were then sold, ranging in price from $5 and upward; also quite a lot of grain, flour in bags, hominy, corn meal, grits and other foods for man and beast. The celebrated Hungarian flour brought $16.50 per bag of 280 pounds. The sale was largely attended by dealers and consumers, and taken all in all was quite a success, the amount realized from the sale far exceeding the expectations of those interested.

—Mr. Mason, of Natal Colony, South Africa, who came to Cincinnati solely to see the Millers' Exhibition, says he was amply repaid for his trip of 11,000 miles, here and back, by the display of milling machinery he saw. When he first noticed the advertisement in a milling journal from this country he had barely time to reach this city by constant traveling, not allowing for any detention, but, nevertheless, he started at once, arriving here in time to view the great show during the last three days.

—The Messrs. Furth, of New Zealand, who also came for the single purpose of attending the Exhibition, were very much pleased, and say they will buy a large and complete milling outfit before returning home.

—Exhibitors are requested to remove their goods as early as possible.

—All parties having claims against the Exhibition must present them at once.

Old Song.

Forwarded by a Correspondent.

Oh! A Miller had three sons
Such rogues as e'er were seen;
And he turned them all three out of doors
Because they could not sing.
Chorus—Because they could not sing,
Because they could not sing,
And he turned them all three out of doors
Because they could not sing.

Oh! the first, he was a miller,
The second, he was a weaver,
And the the third, he was a wee tailor
They thought so wondrous clever.
Chorus—They thought so wondrous clever, &c., &c.

Oh! the miller, he stole corn;
The weaver, he stole yarn;
And the tailor, he stole good broad cloth
To keep these three rogues warm.
Chorus—To keep these three rogues warm, &c.

But the miller was drown'd in his dam,
The weaver was hung in his yarn,
And the devil flew away with the little tailor,
With the broad cloth under his arm.
Chorus—With the broad cloth under his arm, &c.

The Two Mill Owners.

There were two men (about 1838), Stickpenny and Whewell, who owned a saw-mill near Old Town, Maine, in common. The arrangement under which the mill was operated was that each one had the mill all to himself during alternate weeks. Stickpenny was a mean, rusty old chap. Whewell was a shrewd, investigating young man. The mill was run by a crude, rough kind of an undershot wheel that gave very little power for the amount of water used, so that the water was often short. Whewell wanted to put in a new iron spiral vent wheel, then just coming out, but Stickpenny would have nothing to do with it. He wasn't going to lay out money for any "such job as that." Finally, Whewell said he would pay all the bills, to which Stickpenny at last agreed, "but provided you put the wheel in in your week." So the new wheel was put in, and Whewell, being of a mechanical turn of mind, experimented with it, and soon found that by plugging up some of the orifices the saw went through the log faster than when they were all open. So he plugged them up during his week, and always pulled the plugs all out again for Stickpenny to operate with. Soon it began to be noticed that somehow or other Whewell always managed to saw a couple of thousand feet more of lumber in his week than ever Stickpenny could, no matter how the pond was. Finally, Stickpenny went down to see Whewell about it.

Says he: "Whewell, how is it that you manage to saw more lumber in a given time than I can when my turn comes round?" Says Whewell: "Don't you know how that is? Waal, I'll tell you. It's because you ain't been treatin' of me fairly in this matter. It's ag'in nature. You can't expect the mill to saw as well for you as it does for them as do the square thing all around." Stickpenny wouldn't believe that and went away. But still the mill went on turning out regularly more lumber for Whewell than Stickpenny managed to get out of it; so finally the latter came around and said, "What's your bill? I'll pay my share." He paid it, and thereafter Stickpenny managed to saw lumber just as lively as Whewell did. "Well," said the old fellow, "I always knew that the folks around here were all ag'in me, but I never thought that the Almighty was;" and he died without finding out the explanation of it at all.

The Proportion of Patents to Population.

One of the most interesting subjects connected with the growth and development of manufactures in various parts of the country is presented in the yearly reports of the Commissioner of Patents, where the number of patents granted to each State yearly, and the proportion they bear to the population of the State, are presented in tabular form. It is only a few years since that the Patent Office began to issue any large number of patents to the Western States, Massachusetts and Connecticut and New York and Pennsylvania, as being the principal seats of manufacturing industries, standing far ahead in this matter. It is of the last importance, however, in making comparisons of this kind that we proceed from correct data as to the actual population. For the past ten years the growth of the country has been wonderfully rapid, and yet the population as given by the census of 1870 is made the basis on which the Commissioner of Patents figures out the proportionate number of patents to the total population of each State. New York State, for instance, for 1879 was credited with 2,556 patents, which was given as one for every 1,717 inhabitants. Now it is probable that the population of the State by the census being taken this year will show an increase possibly as large as one million. This, of course, would materially change the proportions thus given, and from this kind of reasoning from deficient data the proportion of patents to population has, for most of the last ten years, been made to appear larger in nearly all of the States than it actually has been.—*Scientific American.*

So great is the demand for N. F. Burnham's "Standard Turbine," and the milling machinery manufactured by the Christiana Machine Company, of Christiana, Pa., that they have been compelled to again enlarge their works. They are now building an entire new foundry of large dimensions, and extending their machine shops to nearly twice their former capacity. Their motive power has heretofore been supplied by two turbine wheels; this has been increased by adding one of their new improved 20-horse-power cut-off steam engines, which is said to work admirably and with the greatest economy of fuel. This company is well equipped, and can do the best class of work with dispatch.

Manufactures in a Young Country, and How to Establish Them.

A young country like Canada has to do with economic questions under circumstances very different from those which exist in England. England has markets for her agricultural products at her own doors, a deficiency of food, surplus capital and unemployed labor; Canada has a surplus of food, products for which there is no market, unless in foreign countries, and agricultural products are heavy and costly of transit; we have, too, a deficiency of capital and labor. Protection encourages the investment of foreign capital in local industries, and brings in the skilled labor necessary for these. Local markets, the great want of a new country, are rapidly created; and good markets mean good profits and good wages. They stimulate production and lead to wealth. Where most of the population, as in Canada, are farmers, the products of the field find few purchasers except for export. Prices are poor, and the cost of transport to markets three or four thousand miles away, lowers to a minimum the profit of the producer. Alderman Mechi, in his work (1864), "How to farm profitably," says:

"It is precisely because British farmers have their customers—the British manufacturers—almost at their doors, and that other corn producing countries have not manufacturers, that British agriculture is rich and thriving."

Adam Smith, in his "Wealth of Nations," says:

"The increase and riches of commercial and manufacturing towns contribute to the improvement and cultivation of the countries to which they belong, in three ways. 1. By affording a great and ready market for the rude products of the country."

Even in the most recent works written in England solely in the interest of free trade, we have, inadvertently perhaps, a similar advocacy of the influence of manufacturers in increasing the value of land through local markets, Baden-Powell, in a work published this year on Free Trade, says, p. 78:

"Soils acquire a secondary value by the rise of market towns or manufacturing districts."

Manufactures add another population to the agricultural; these again give rise to commerce, with their kindred industries, and thus superadd another population. England, pure agricultural, could not support more than four millions of people; but England, agricultural, manufacturing and commercial, swarms with twenty-two millions. Canada has but four millions; but Canada, with all those industries, might now easily support ten times that number. At the beginning of the 18th century, Macaulay says, the value of the products of the farm in England, with only half the land cultivated, far exceeded all other fruits of industry; yet now, with the vast improvement in agriculture, and the additional one-half of the land brought under tillage, the soil is the least of the three great sources of wealth, so marvellous under the most rigid protection, had been the development of manufactures and commerce. One hundred and fifty years ago England had a population no more than Canada has to-day. Now, after 150 years of protection and 30 of free trade, she has twenty-two millions, three-fourths of whom are engaged in manufactures, commerce, and other pursuits unconnected with the soil, giving good home markets, bearing the burdens of State, and adding to its prosperity in peace and strength in war. With manufactures we get that illimitable power—steam—which in England alone is capable of doing more work than the entire human family. With this vast creative power we can give employment to our own people, develop our country and multiply a thousand-fold the wealth-producing agencies. What then are the means by which we can obtain capital, population and skilled labor, manufactures and commerce; by which we can keep amongst us our young men and women; call to our shores a greater tide of immigration; secure that power more prolific than all others in the creation of wealth; give our farmers local markets, better and steadier prices; swell our commerce to such dimensions as to make easy the completion of our magnificent internal navigation an interoceanic communicaiion, with all that is necessary for a complete and independent nation, and for the full development of the country? Amongst these means we believe none more potent than protection to native industry. Our manufactures must be protected in their infancy. Many instances are given in the history of trade of stronger manufactures of old communities sacrificing large sums to crush out the weaker industries of young countries. We find in reports of Committees of the English House of Commons, statements that sums as high as two millions of dollars have been sacrificed by rich manufacturers to destroy rivals in other countries. We do not want, therefore, either a Zollverein with American States to shut out English and foreign competition, nor do we want such a reciprocity as would place our weaker industries at the mercy of strong rivals. We want protection pure and simple to such manufactures as may be adapted to the condition of the country, and these once established, we are satisfied the national mind will be prepared to discuss, in detail, all questions connected with a Zollverein or a liberally constructed Reciprocity Treaty.

It is well known that flour made by stones is of a darker yellow shade than that made by rollers, even if the same clean middlings are used in both operations; it is also found that rollers with differential speed give a more yellow flour than roller mills with equal speed, chilled iron rollers a more yellowish flour than porcelain rollers, and unventilated millstones a more yellowish flour than those with ventilation. In some experiments made by a German chemist to ascertain the cause of these differences, fine wheaten flour, No. 00, was heated, and the temperature carefully raised to 212 degrees Fahrenheit, the flour being contained in an evaporating pan in a hot-air bath, and on examination, not the slightest difference could be detected. On the temperature being raised to 316 degrees Fahrenheit, the flour lost a little of its yellow color, and became somewhat darker, but the difference in color was less than a number. The well-known brown color of the flour first appeared on the temperature being raised to 392 degrees. From the experiments it would seem that the above-mentioned difference in color cannot be attributed to heating during the grinding. The same wheaten flour, No. 00, on being pounded in an agate mortar in very small quantities, at a considerable pressure, showed a decidedly white color.

Grain is King.—Returns just issued show that for the ten months ending April 30, 1880, the value of breadstuffs exported from the thirteen principal ports was $207,000,000, against $149,000,000 for the corresponding period of 1879, an increase of 35 per cent or more. Of this amount wheat and wheat flour represent $164,000,000, and corn and corn meal about $40,000,000. It will be seen that the quantity of other grain exported are insignificant, barley and oats together footing up only about half a million dollars. Of the $207,000,000 worth of breadstuffs, $188,000,000 worth was shipped from four points, New York, Boston, Philadelphia and Baltimore, New York alone shipping $105,000,000 worth, or more than one-half of the whole export of the United States. This showing does not look as if New York was losing ground in competition with the other great Altantic ports, notwithstanding her comparatively poor terminal facilities and the great efforts made of late years by her rivals. New York has this advantage, that a vast amount of shipping must arrive there in the course of commerce, and after discharging inward cargoes most of them are eligible for grain, thus securing plenty of competition in freights for the port and consequently low freights to Europe.

A correspondent of the *Mark Lane Express*, in Western Australia writes, under date April 22: After an unusually hot and long summer we have been blessed with a copious downfall of rain in three separate storms, which have moistened the medium soil sufficient to admit of ploughing them, but stiff soils must await further downpour. If millers of capital in England knew of the deficiency of mill power here, I think they would turn their attention to it. In this the most important place in the colony, except the port or city, there is nothing worth the name of a mill, and 10d per bushel is charged for grinding wheat in the makeshift machine we have, so the settlers must send their corn 10 miles over rough roads and back again to get it ground. No wonder they prefer soaking wheat for pigs and barley for horses. If they go to storekeepers for wheat meal they are asked 1½d per lb, whilst their own wheat is worth but 1d per lb or 3s per bushel, for grinding and carting an article of which they perhaps have plenty, and can sell at no more than 5s. The same storekeepers will sell you excellent flour at the same price as the meal, so that is the cheapest thing on which to fatten hogs, for which the price is but 6d per lb by the carcase; the salt pork is only to be had by paying 10d.

NEWS.

EVERYBODY READS THIS.

ITEMS GATHERED FROM CORRESPONDENTS, TELEGRAMS AND EXCHANGES.

B. Luhkenbill, Gosport, Ind., has ordered a "Queen of the South" pony middlings mill.

J. A. Linscott, Fair Haven, Minn., is adding several of the "Queen of the South" mills.

J. W. McFarland, Clay City, Ills., has ordered a 26-inch "Queen of the South" mill.

Dremen, Smithmeyer & Co., Freelandsville, Ind., have ordered a 22-inch pulley mill.

J. F. Kettlejohn, Polk Patch, Ind., has ordered two "Snow Flakes" to replace the purifiers now in use.

Simpson T Gault are furnishing Huxtable & Co. a run of buhrs and other machinery for their mill at Laurel, Ind.

H. C. Stump, Paris, Ohio, has ordered one of Simpson & Gault's "Queen of the South" mortise geared corn mills.

J. H. Wernke & Son, Morris, Ind., are putting in one of Simpson & Gault's "Champion" smutters and separators.

Reid & Son, St. Paul, Ind., are having their mill overhauled. They have arranged with Simpson & Gault for their new machinery.

Simpson & Gault are overhauling the mill of Woods & Taylor, Saltillo, Tenn. They are adding new buhrs, a "Champion" Smutter, etc.

Kerr & Bro., of Upper Sandusky, O., are remodelling for new process. Simpson & Gault have been awarded the contract of furnishing the necessary machinery, "Snow Flake" purifiers, etc.

The extensive flouring mill of T. S. White, of Bellton, on the Baltimore & Ohio Railway, near this city, was totally destroyed by fire June 24. Loss, $20,000; insured, $4,000.

The Los Gatos Manufacturing Company, of Los Gatos, Cal., have purchased seven 16-inch mills from the Milwaukee Middlings Millstone Company. They have been experimenting with these mills for some time, and are now remodeling their mill in accordance with the new principle that the Milwaukee Middling Millstone Company has introduced so successfully in Wisconsin and neighboring States.

A. E. Mullens, of Lincolnton, N. C., has just received from the Christiana Machine Company, Christiana, Pa., a 21-inch Burnham turbine wheel and a lot of machinery for improvement in his mill.

P. L. Cannady, of Wilton, N. C., is about erecting a circular saw mill, and will run it with a 36-inch Burnham turbine wheel, which with the necessary gearing, is being furnished by the Christiana Machine Company, Christiana, Pa.

The Christiana Machine Company, of Christiana, Pa., have recently shipped a 60-inch Burnham turbine wheel and a lot of heavy gearing to Malloy & Morgan, of Laurel Hill, N. C., to be used in driving their cotton mill at that place.

Pendleton & Bro., Augusta, Ga., have lately purchased a 27-inch Burnham wheel (turbine).

D. McElner, of Elkton, Md., is putting in a 27-inch Burnham turbine wheel to use in place of a 25-inch Eclipse and a 26½-inch Leffel.

Thos. Walker, of Gardiner, Me., has ordered from the Christiana Machine Company, Christiana, Pa., a 48-inch Burnham turbine.

Samuel Winter, Oxford, Miss., is putting in a 15-inch Burnham turbine wheel.

W. & L. Lanier, West Point, Ga., have purchased of the Christiana Machine Company, Christiana, Pa., two of N. F. Burnham's 48-inch standard turbine wheels for their flour mill.

The firm of Sooy, Brinkman & Roberts, millers, at Great Bend, Kan., has been succeeded by Brinkman & Roberts.

Mr. Thomas Allison, of Gratis, Preble Co., O., has rented a mill at Fairhaven, Preble Co., O., and will go there July 1.

Oregon has 20,000,000 acres of the best wheat lands in the world. The Northern Pacific and the millers are reaching for it.

The firm of Kratz & Munch, millers at Junction City, Oregon, are succeeded in the milling business by Kratz & Washburne.

A boy named Edward Morgan was instantly killed by being caught in the machinery of the Brazil flouring mills at Brazil, Ind.

A. C. Lut & Co. are building a new four-run steam mill at Fulton, Ky. John P. Dale & Co., of Nashville, Tenn., are the contractors.

The mill of Messrs. Cockburn & Budd, at Gravenhurst, Ont., narrowly escaped being destroyed by fire from an adjoining building.

Mr. Thomas Smith, millwright, at Cincinnati, Ohio, has just returned from putting up a malt house and grain department at Versailles, Ky.

Hon. Asa Faulkner is building a new mill at McMinnville, Warren Co., Tenn. Mr. C. W. Gruber is leaving Brownsville, Tenn., to take charge of it.

Lauberman & Smith, Huntingdon Tenn., are building a two-run steam custom mill. John P. Dale & Co., of Nashville, Tenn., are the contractors.

B. Terhune, of Bradfordville, Ky., has contracted with Nordyke & Marmon Co., of Indianapolis, Ind., for a two-run steam mill, with late improvements.

J. S. Brillhart, Upper Sandusky, Ohio, has rented his mills at that place, and will travel in the interest of the commission house of Geo. F. Johnson & Co., New York.

One thousand dollars and the best mill site in Southwestern Nebraska will be given by the citizens of Alma, to the party who will built a first-class mill there at once.

A. Eisenmayer & Co., of Trenton, Ill., are changing their mill to a Gradual Reduction Roller System. Edward P. Allis & Co., of Milwaukee, Wis., have the contract.

W. C. & L. Lanier, West Point, Ga., have purchased of the Christiana Machine Co., Christiana, Pa., two of N. F. Burnham's Standard Turbine Wheels for their flour mill.

Mr. L. T. Plummer, of Abingdon, Ill., has contracted with C. E. Goshert, of Sterling, Ill., for bolting cloths for three reels, and to make various other changes in his mill.

Mr. Geo. Post, of Cumberland, Wis., has put into his mill one of Obenchain's "Little Giant" Turbine Water Wheels, manufactured by Knowlton & Dolan, Logansport, Ind.

We neglected to state in our May issue that John P. Dale & Co., of Nashville, Tenn., were the builders of Curd & Townley's mill at Paris, Tenn., described in that issue.

Mr. B. C. Church, senior member of the firm of Church & Patterson, millers, at Sterling, Ill., has just returned from Breckenridge, Col., where he has a son engaged in mining.

Mr. James W. Turner, of Spruce Grove, Lancaster Co., Pa., a well-known miller, had the misfortune, on the 26th of May, to lose by death his only son, E. Ellsworth Turner, aged 20.

Work is progressing rapidly on J. B. A. Kern's new roller mill in Milwaukee, Wis. It is said that he will probably have specimens of all the well-known roller mills manufactured.

Isaac Mattis, of Elizabethville, Pa., is improving his mill, and putting in a 30-inch Burnham turbine wheel, and machinery made by the Christiana Machine Company, Christiana, Penn.

D. J. Hyden, an excellent millwright, is remodeling John N. Coiner's mill at Waynesboro, Va., and has purchased the necessary machinery of the Christiana Machine Company, Christiana, Penn.

During the present year three grain elevators, and perhaps more, will be built in Chicago. Chicago grain dealers claim that they need at least 50,000,000 bushels of elevator capacity.

Treague & Wilkinson, Greenville, Ala., are improving their mill, and the Christiana Machine Company, Christiana, Penn., are supplying them with a 27-inch Burnham turbine wheel and the necessary machinery.

William Thompson, of Virginia City, Montana Territory, has purchased from Knowlton & Dolan, Logansport, Ind., one of Obenchain's Little Giant turbine water wheels, eight inches diameter, to drive a circular saw mill under sixty feet head.

A new grist mill is to be erected at Sand Creek by Mr. Burg.

A new mill is to be built in the near future at Nicolett Station.

Williams & Co., of Houston, intend to change their mill into a roller mill.

The firm of S. Kenworthy & Co., millers, at Rapidan, has been dissolved.

A new mill is to be built at Watertown. Theo. Kenning, of Chaska, has the contract.

Otto Troost, of Winona, is making great improvements, to be ready for the coming crop.

The mill dam at Bevens Creek Mill, in Carver County, was washed out by the recent rains.

The recent high water damaged the mill property at Whalen, to the extend of about $2,000.

Smith and Gaylord's mill at Lake City, was damaged by the flood to the extend of about $1,200.

The Houston mill near Chatfield has been leased by Burgan Bro., for a term of five years.

The mill at Park Dale was among those that suffered from the flood of last month, its dam being washed out.

The big mill of the Winona Milling Co., at Winona, has been running night and day, we learn from the *Republican*.

Mr. J. A. White has sold his half interest in the Greenleaf Mills at Greenleaf, and has leased the Eagle Mills at Kingston.

Hubbard's big mill at Mankato, which was illustrated in these columns last fall, was damaged to a trifling extent by the hurricane.

During a severe storm of wind and rain at Pickwick, June 10, the roof of the large flouring mill of W. Davis & Co. was blown three-quarters off.

Mr. Tallman, of Brunswick, suffered quite a loss in the recent freshet. The dam at his mill was carried away by the water, and his property otherwise injured. He will probably rebuild at the steamboat landing.

Mr. Campbell, of the firm of Brookins, Abbott & Campbell, of Richwood Mills, Richwood, Becker Co., has bought out the other members of the firm. He will commence to make changes in his mill some time in August.

Great damage was done to the mill property at Money Creek on June 9 by heavy storms. The creek near the mill took an entirely new channel, so that no grinding can be done until the water is turned back. To restore this to its former condition it is estimated to cost $1,000.

During the late storm at Red Wing the accumulated water carried away the dam of the mill on Hay Creek, owned by Benjamin Taylor. The dam of George Erby's mill on Wells Creek was also washed away, and other damage inflicted. The dam of Myers & Frederick's mill, on Hay Creek, was greatly damaged.

The firm of S. Kenworthy & Co., Rapidan, consisting of S. Kenworthy, H. W. Mendenhall and James B. Swan, dissolved partnership May 20. Mr. Kenworthy sold his interes to Hans Knudsen, who now becomes an equal partner with Messrs. Mendenhall and Swan, and the firm bears the name of the Rapidan Mill Co.

Michael Coughlin, a workman employed in the flouring mill of the L. C. Porter Milling Co., at Winona, was smothered to death in a sawdust hopper June 2. He had charge of the conveyor which fills the hopper from the sawdust pile, and is supposed to have fallen into a hole formed in the sawdust while leveling it off and stopping the conveyor.

Messrs. Hillyer & Bingham, proprietors of the City Mills at Faribault, have purchased the famous Red Jacket Mills at Mankato of J. P. Tolman & Co., and will continue both mills. The Red Jacket is a four-run mill with rolls and all the latest improved machinery. Messrs. Hillyer & Bingham are enterprising men, and keep pace with the times. Mr. H. W. Mills has left the City Mills at Faribault and will take charge of the Red Jacket. The latter will, therefore, be in first rate hands.

J. H. Prince, miller at Harmony, Village, Va., is dead.

L. Livermoor, miller at Pendleton, Oregon, has sold his mill.

Weshner & Hollenber have sold their flour mill at Neshkoro, Wis.

The milling firm of Green & Adams, at Opelika, Ala., has dissolved.

Michael Kreider, miller, at Lovington, Ill., has removed to Mattoon, Ill.

The paper bag mill of Thos. Nixon, at Dayton, Ohio, was burned on May 20.

Colburn & Bros. have built a new four-run steam mill at McPherson, Kansas.

E. E. Davis, miller at Minerve, Ohio., has admitted Willard Davis to partnership.

George Peacock, miller at Algonquin, Ill., is succeeded by Wm. & G. M. Peacock.

Calkins & Dunning have succeeded A. C. Calkins in the flour mill at Allegan, Mich.

The firm of D. Suppiger & Co., millers at Highland, Ill., have dissolved partnership.

The St. George's mill, of St. Louis, are putting in the Gray's patent noiseless roller mills.

Thos. C. Broadbent, of Ada, Mich., has rented the Mayflower Mills, at Constantine, Mich.

A. McMurtrie & Co., of Belvidere, N. J., are adding more Smith Purifiers to their extensive mills.

One acre of frogs will pay better than thirty-five acres of wheat. And yet the farmers will croak.

At Manilla, Ind., the flouring mill was unroofed by the cyclone that lately swept over that State.

C. Templeton, of Sharpsville, Pa., has been overhauling his mill and putting in a double Smith Purifier.

H. H. Hilman & Co., proprietors of the steam flouring mills at Newport, Ky., are remodeling for new process.

Wm. Ackerman, of Stroudsburg, Pa., is remodeling his mill, putting in new bolts, millstone and Smith purifier.

Steel Making in China.

In the manufacture and use of steel, as in other symbols and aspects of civilization, the Chinese appear to have attained a very early and remarkable proficiency. Mr. Jeans, in his recent work on steel, says that unfortunately Chinese records do not enlighten us as to the precise period at which the art of reducing metals from their ores became known in that country, but it is evident it must have been some centuries before the Christian era. It is not, indeed, unreasonable to conclude that this knowledge was at any rate concurrent with, if not antecedent to, the discovery of the attractive power of the loadstone, which seems to have been used by the Chinese in the reign of the Emperor Hoangti, about 2600 B. C. Mention made of steel in the most ancient of the Chinese writings, and Leih-tze, an author who flourished about 400 B. C., describes the process by which it was made. In the Yu Kung section of the Shoo King, Book I., it is stated, that among the articles forming the tribute of Yu, were nautical gem stones, iron, silver, steel, stones for arrow heads, etc. Legge points out the difference of soft iron, and hard iron or steel, as distinguished by the Chinese, and remarks that in the time of the Hau dynasty, ironmasters were appointed in several districts of the old Leangchou to superintend the iron works. With the exception of this passage, however, it is considered probable that there is no distinct allusion to iron in Chinese writings older than 1000 B. C. In describing the manufacture of steel in China, the Pi-tan, or Pencil-Talk, states that wrought iron is bent or twisted up, and unwrought iron is thrown into it. It is then covered up with mud and subjected to the action of fire, and afterward to the hammer. On this passage, Day remarks that it comes remarkably near describing the process of immersing wrought iron either into molton cast iron, or heating it with iron ore and fuel covered over with layers of mud or clay, to exclude, as much as possible, the oxidizing influence of the external atmosphere. At a subsequent period the Chinese records describe the different kinds of steel produced. That obtained by the first process they call ball steel *Twan Kang* (from its rounded form), or sprinkled steel, *Kwan Kang* (from the pouring of water). Another kind is spoken of as "false steel," "wei tee," and it is quaintly added, that "iron has steel within it, as meal contains vermicelli." In the "Peut Saow" (a work of the Ming dynasty), again, three kinds of steel are described, thus: "1. That which is produced by the adding of unwrought to wrought iron while the mass is subject to the action of fire. 2. Pure iron many times subjected to fire produces steel. 3. Native steel, produced in the Southwest, at Hai Shau, and which is like in appearance to the stone called *Tsze-shit-ying* — purple stone efferessence." Steel continues to be manufactured in China to the present day. James Henderson, a commissioner of Li-hung-chang, the Governor-General of Chilili, and minister of the young King of China, states that "the steel which comes to Tien-tzin from the upper Yangtsee is highly prized, and bears much higher prices than the Swedish steel imported into China.

RAILWAY SLEEPERS.—The Belgian Government is reported to have decided upon the abandonment of wooden railway sleepers, and the adoption, instead, of those of iron, an example which is thought will be largely imitated.

Why the Needle Points in a Northerly Direction.

Prof. Patterson, Superintendent of the United States Coast Survey, writes as follows in answer to an inquiry by a gentleman as to the reason why the needle points in a northerly direction:

Dear Sir:—Your note is duly received, and in answer I beg to state that the reason why the needle points in a northerly direction is that the earth in itself is a magnet, attracting the magnetic needle as the ordinary magnets do; and the earth is a magnet as the result of certain cosmical facts; much affected by the action of the sun. These laws have periodicities, all of which have not as yet been determined.

The inherent and ultimate reason of the existence of any fact in nature, as gravity, light, heat, etc., is not known further than that it is in harmony with all facts in nature. Even an earthquake is in perfect harmony with, and the direct resultant of the action of forces acting under general laws.

A condensed explanation in regard to the needle pointing to the northward and southward is as follows The magnetic poles of the earth do not coincide with the geographical poles. The axis of rotation makes an angle of about 23°, with a line joining the former.

The northern magnetic pole is at present near the arctic circle, on the meridian of Omaha. Hence the needle does not everywhere point to the astronomical north, and is constantly variable within certain limits. At San Francisco it points about 17° to the east of north, and at Calais, Maine, as much to the west.

At the northern magnetic pole a balanced needle points with its north end downwards in a plumb line. At San Francisco it dips about 63°, and at the southern magnetic pole the south end points directly down.

The action of the earth upon a magnetic needle at its surface is of about the same force as that of a hard steel magnet, 40 inches long, strongly magnetized, at a distance of one foot.

The foregoing is the accepted explanation of the fact that the needle points to the northward and southward. Of course no ultimate reason can be given for this natural fact any more than for any other observed fact in the nature.

C. T. Patterson.
Supt. U. S. Coast Survey.

Internal Effect of Hammering Metals.—If an iron bar be held in the line of the dip of the magnetic needle, and struck upon the the upper end with an ordinary hammer, it will become polarized, one end repelling, the other end attracting the magnetic needle. Reverse the bar, and strike it on the opposite end as many blows as before were given, and both ends will attract the magnet. Give two or three more blows, and the bar shows magnetic effects the reverse of those first obtained. Something, therefore, has occurred in the bar due to hammering impact, and the recognition of this makes it in a measure apparent why the compass needle in iron ships may be affected in consequence of the tremor to which the vessel is subjected owing to blows of the waves.—*Appleton's Cyclopedia.*

A Japanese Invention.—The Japanese have devised a new process for photo-engraving, which is described as follows: A substance is used in making Japanese lacquer which becomes as hard as stone when exposed to the action of sunlight. A slab covered with this material is exposed 12 hours to daylight, which is allowed to pass through the "negative" plate placed in front of it. By this time the slab has become hardened to different degrees, according to the intensity of the light falling on it, or, in other words, according to the light and shade of the negative in front; and upon carefully scraping away the softer parts a pictorial surface in low relief is obtained similar to an engraver's block, and suitable for printing from.

The Oldest Newspaper in the World.—The official organ of the Chinese Government, known as the Pekin *Gazette*, is certainly a most remarkable journal. Not only is it the oldest newspaper in existence, but it is highly probable that it was the first journal ever published, and what is more, the first that was ever printed; for it is pretty well settled that the spread of news by means of written documents was attempted in Europe at certain periods long before the day of the printing press. The contributors of the *Gazette* are now, and have been for many centuries, the ablest men in a country noted for the attention paid to education. On this account the files of the paper must, at some future time, prove of immense service to the historian who desires to write an account, not only of the Chinese Empire, but the Asiatic nations with which, in times past, she has held diplomatic intercourse. Although the paper is published under the immediate supervision of the Government, this must be said of it, that its columns have been open to those holding divergent opinions, and from this point of view it has carried out the modern idea of a review more thoroughly than the modern conception of a newspaper. An instance of this impartiality can be found in the recent publication by it of the letter written by Wu-ko-tu, one of the Board of Civil Office, just before his suicide, reflecting severely on the usurpatious action of the Empresses-Regent. The intent of this document was to force them to abdicate, and their arguments against their further continuance in power were very strongly given. A civilized despot would have deemed it advisable to suppress this seditious communication but the Chinese rulers have perhaps shown their good sense, as they certainly have their consciousness of strength, by giving it the publicity its author desired.

An Agricultural Creed.—According to the *Canada Farmer* the agriculturists of Canada met in convention not long ago and adopted for themselves the following creed: "We believe in small farms and thorough cultivation; we believe that the soil lives to eat, as well as the owner, and ought, therefore, to be well manured; we believe in going to the bottom of things, and therefore deep plowing, and enough of it, all the better if it be a subsoil plow; we believe in large crops which leave the land better than they found it, making both the farm and the farmer rich at once; we believe that every farm should own a good farmer; we believe that the fertilizer of any soil is a spirit of industry, enterprise and intelligence; without these, lime, gypsum and guano would be of little use; we believe in good fences, good farm houses, good orchards, and children enough to gather the fruit; we believe ina clean kitchen, a neat wife in it, a clean cupboard, a clean dairy, a clear conscience; we believe that to ask a man's advice is not stooping, but of much benefit; we believe that to keep a place for everything, and everything in its place, saves many a step, and is pretty sure to lead to good tools and to keeping them in order; we believe that kindness to stock, like good shelter, is saving of fodder; we believe that it is a good thing to keep an eye on experiment, and note all, good and bad; we believe that it is a good rule to sell grain when it is ready; we believe in producing the best butter and cheese, and marketing it when it is ready." All this may certainly be commended as "sound doctrine."

Bismark in His Family.—It is realy difficult not to be struck with the contrast existing between Prince Bismarck's terrible reputation and the patriarchal picture represented by the family of which he is the head when he returns home to rest from the ardent struggle in which he has so long been engaged. Nothing is more simple and touching than the respectful and silent enthusisam with which his wife and children surround him and the devotedness they show to him. In his family circle he lets himself be governed by their anxious tenderness. When he leaves the table his wife or son brings him his long clay pipe and lights it for him. This first pipe smoked, a second, all ready, is handed to him, and this is afterward generally taken away from him without a third being brought.

The Prince yields to this silent tyranny which relieves him of a portion of his personal cares. His son Herbert told me, "I have put my father to bed for he, too, ends by being tired." He is treated indeed, by his family as a demigod, and cared for as an infant. On hearing him chat with his family one is struck by the clearness with which he expresses himself, the grace with which he stoops to familiarity, and also the feeling of irresistible force which he inspires, so that when once he has said anything it becomes law. Even when he unbends the most naturally you are conscious that he has only to clinch his fingers to crush an adversary.

Mark This.—Did you ever know a man who grew rich by fraud continue successful through life and leave a fortune at death? This question was put to a gentleman who had been in business forty years. After reflecting a while he said: "Not one. I have seen many men become rich as if by magic and win golden opinions, when some little thing led to an exposure of their fraud, and they have fallen into disgrace and ruin. Arson perjury, murder and suicide are common crimes with those who make haste to get rich regardless of the means." Boys, stick a pin here. You will soon be men, and begin to act with those who make money. Write this good man's testimony in your mind, and with it put this word of God: "He that hasteneth to be rich hath an evil eye, and considereth not that poverty shall come upon him." Let these words lead you to resolve to make haste slowly when you go into business in the matter of making money.

Curious Experiment on Light and Heat.—If a piece of wood be placed in a decanter of water and the focus of a large burning glass is thrown upon it, the wood will be completely charred, though the sides of the decanter through which the rays pass will not be cracked, nor in any way affected, nor the water perceptibly warmed. If the wood be taken out and the rays thrown on the water, neither the vessel nor its contents will be in the least affected; but if a piece of metal be put into the water, it soon becomes too hot to be touched, and the water will presently boil. Though pure water alone contained in a transparent vessel cannot be heated, yet, if by a little ink it be blackened, the effect speedily takes place.

It is a curious fact, not generally known, that at a certain point in the Upper Columbia, close to the water's edge, the fine sand is continually traveling up stream in one eternal procession. Talk of the great army of Xerxes on the march—what was that to the myriad battalions that pace the marge of the mighty river? In comparison with these tiny travelers what are the "leaves of the forest when summer is green?" This sand is being continually washed ashore, and as the water falls away with the dearth of the season it dries, is taken up by the winds, carried back up stream, is blown into the water, and makes another voyage; and so the work of the transportation back and forth, by land and sea, goes on forever and ever.

The Culture of the Rose.

Among other most excellent articles in the June number of *Scribner's Monthly*, is the following on the propagation of roses, which is both timely and instructive:

Every rose will not come from the slip. Of the three great divisions into which the rose family is separated, viz., the damask, the noisette and the tea, the last two may be propagated with more or less readiness from the slip, or by budding; the first only by dividing the roots and planting the seed, which latter method is resorted to, however, only when it is desired to obtain new varieties.

The best season for taking those slips is in June, just after the profuse bloom of early summer is over, although a person who knows exactly how to cut a slip may find good cuttings throughout the warm months. Judgement and discernment are needed for the selection at all seasons. I know a generous lady who sent her friends immense armfuls of boughs, with hardly a real cutting upon them.

One should choose from a good vigorous branch of last year's growth a fresh shoot, containing two or three buds, such as will always be found more or less swollen at the base of the leaf stems. It should be cut from the parent branch diagonally, with a smooth, clean cut that will bring off a little of the old bark as well, in order to make the condition as favorable as possible for the formation of roots.

Have ready a box or pot of rich mould. With a round, pointed stick, make a hole several inches deep, and fill it up with clean sand; insert the end of the slip in this sand to the depth of one or two inches; be sure to make it firm in the soil, and the sand acting as a percolator for moisture, you may keep your slip well watered. You can soon see, by the swelling of the buds and the dropping off of the old leaves, whether the slip is indeed taking root, but do not attempt to remove it to the place where you would wish it permanently to remain, until it has put out several sets of new leaves.

An ingenious way to raise a set of slips has been recommended by Mrs. Loudon, which we have tried with unvarying success. It is to take an earthenware flower pot, gallon size, and fill it more than half full of broken potsherds, pebbles, bits of slate, or such things; now set in the middle, on top of these refuse materials, another similar flower pot, half pint size, with the hole at its bottom stopped up tightly with a cork; let its mouth be even with that of the large outer one; fill up the interstices with silver sand or other pure sand, and set in a row of slips all around, cut according to the directions given above Keep the inner pot full of water all the time, but do not water the slips directly. In about six weeks your slips will have fine roots, and can be potted. A hand glass always hastens the process of rooting, and enables you to take advantage of the sunshine, but if you are not provided with one, be careful to keep your plants in the shade until they show certain signs of independence of life.

Roses need very rich soil to bring them to perfection, thriving best in a mixture of well-rotted manure, sand and garden loam, and to stint them of nourishment is indeed poor economy.

California Wheat.

An informal meeting of prominent wheat shippers was held a few days ago at the office of Balfour, Guthrie & Co., to facilitate the proper purchase, handling and shipment here and sale in Europe of California wheat crops. There were present several representatives of the Grangers, Edward Paul, of Ross J. Smyth & Co., and Richard Cornelius, of Cornelius & Bourgoise, corn merchants of Liverpool, who are on this coast for a pleasure visit. Mr. Paul expresses the satisfaction experienced by his firm and other buyers in Europe of California No. 1 or superior wheat; also the disappointment caused by the inferior, various, mixed quality of California No. 2 or average wheat cargoes, which latter, he stated, usually contained a portion of very inferior wheat, mixed throughout the cargo, greatly reducing the quality and value of the latter to such an extent that Liverpool buyers generally bid one shilling per quarter (five cents per cental) less for such cargoes than they would for cargoes all equal for No. 2 quality. He urged those present to do their utmost to remedy the evil, and after a discussion it seemed to be the sense of the meeting that wheat buyers should act in strict accordance with the regulations of the Produce Exchange and delivery of wheat only when equal to or above quality of samples sold upon, and reject all inferior; also, that buyers should pay relatively low prices for inferior and mixed lots of wheat, and higher ones for straight lots of superior quality. It was suggested that steps be taken to secure early action in the matter by the Produce Exchange, with a view of immediately pointing out the defects of and remedy for existing evils in the wheat trade to farmers and all interested, particularly emphasizing:

I. That California wheat is rapidly declining in quality and value, as compared with other competing wheats in the European markets, it being a fact that two or three years ago California wheat sold at 2s per quarter above Red Winter and Chilean wheats, while now it is 2s below those wheats, showing a relative depreciation of 4s per quarter, equal to 20c per cental during the last two or three years.

II. That it behooves every good Californian to do his utmost to remedy this by:

First—Careful preparation of his land.

Second—Using no shrunken, but only the best obtainable seed, properly cleaned and bluestoned.

Third—Cleaning foulness from his wheat before sacking it after threshing.

Fourth—Keeping separate, and so selling, his various qualities of choice, good and poor.

The meeting separated after a friendly interchange of ideas as to the best mode of making up standard samples of each season, and the manner of conducting the wheat business generally, from the time the product leaves the farmer until it reaches the European mill.—*Grocer and Country Merchant, San Francisco.*

If We Knew.

If we knew the woe and heartache
Waiting for us down the road;
If our lips could taste the wormwood,
If our backs could feel the load,
Would we waste the day in wishing
For a time that ne'er can be?
Would we wait in such impatience
For our ships to come from sea?

If we knew the baby fingers
Pressed against the window-pane
Would be cold and stiff to-morrow—
Never trouble us again—
Would the bright eyes of our darling
Catch the frown upon our brow?
Would the print of rosy fingers
Vex us then as they do now?

Ah! those little ice-cold fingers,
How they point our memories back
To the hasty words and actions
Strewn along our backward track.
How those little hands remind us,
As in snowy grace they lie,
Not to scatter thorns—but roses—
For our reaping by and by.

Strange we never prize the music
Till the sweet-voiced bird has flown;
Strange that we should slight the violets
Till the lovely flowers are gone;
Strange that summer skies and sunshine
Never seem one-half so fair
As when Winter's snowy pinions
Shake their white down in the air!

Lips from which the seal of silence
None but God can roll away,
Never blossomed in such beauty
As adorns the mouth to-day;
And sweet words that freight our memory
With the beautiful perfume,
Come to us in sweeter accents,
Through the portals of the tomb.

Let us gather up the sunbeams
Lying all around our path;
Let us keep the wheat and roses,
Casting out the thorns and chaff;
Let us find our sweetest comfort
In the blessings of to-day,
With a patient hand removing
All the briars from our way.

"How shall we train our girls?" asked an exchange. Train 'em with about twenty-two yards of black silk if you want to please your girls. A silk velvet train would also make them happy.

Make your farm so valuable by constant improvement, skilful culture, good fruit, ornamental shrubbery and pleasant surroundings, that no money will tempt you to leave it. And then if you are under the necessity, for any reason, of selling, you can secure a much higher price than if your farm had been neglected.

"Have you 'Brown Eyes'?" inquired a charming brunette, as she raised her soft and melting orbs to a clerk whose optics are of the peculiar shade described, in a music store. He blushed modestly as he replied: "Yes, Miss, you know I have; but of what possible interest can that be to you?" "It's the music I want," she softly responded.

Recently a Louisville lady went to pay her respects to one of the latest arrivals on the list of baby-hood, when the following colloquy took place between her and the little four-year-old sister of the new-comer: "I have come for that baby now," said the lady. "You can't have it," was the reply. "But I must; I came over on purpose," urged the visitor. "We can't spare it at all," persisted the child; "but I'll get a piece of paper and you can cut out a pattern."

A Wayside Courtesy.—A minister says: "I once walked a short distance behind a well dressed young lady, and thinking as I looked at her becoming apparel, 'I wonder if she takes as much pains with her heart as she does with her body.' An old man was coming up the walk with a loaded wheelbarrow, and before he reached us he made two attempts to go into the yard of a small house; but the gate was heavy, and would swing back before he could get through. 'Wait,' said the young girl, springing lightly forward, 'I'll hold the gate open.' And she held the gate open until he passed in, and received his thanks with a pleasant smile as she went on. 'She deserves to have graceful attire,' I thought, 'for a beautiful disposition dwells in her breast.'"

Boys, Read This.—A Gentleman advertised for a boy to assist him in his office, and nearly fifty applicants presented themselves before him. Out of the whole number he selected one and dismissed the rest. "I should like to know," said a friend, "on what ground you selected that boy, who had not a single recommendation." "Youare mistaken," said said the gentleman, "he has a great many. He wiped his feet when he came in, and closed the door after him showing that he was careful; gave up his seat to that lame old man, showing that he was kind and thoughtful; he took of his cap when he came in, answered my questions promptly and respectfully, showing that he was polite and gentlemanly; he picked up a book, which I had purposely laid upon the floor, and replaced it on the table, while all the rest stepped over it or shoved it one side; and he waited quietly for his turn, instead of pushing and crowding, showing that he was honest and orderly. When I talked with him, I noticed that his clothes were carefully brushed, his hair in nice order, and his teeth as white as milk; and when he wrote his name, I noticed that his finger-nails where clean, instead of being tipped with jet like that handsome little fellow in the blue jacket. don't you call these things letters of recommendation? I do; and I would give more for what I can tell about a boy by using my eyes ten minutes, than all the letters of recommendation that he can bring me."

For Sale or Exchange.

Advertisements under this head $2 per insertion, cash with order.

FOR SALE—A four run Water Power Mill. Good trade. Healthy climate. Address, mentioning UNITED STATES MILLER, BLANCHARD & BRADLEY,
je Santa Paula, Ventura Co., California.

FOR SALE—A six run Flour and Pearl Barley Mill. Well established trade. Good water power. Owner is old and wants to retire from business. Easy terms. Address, mentioning UNITED STATES MILLER,
R. C. HATCH, Fayetteville, Onondago Co., N. Y. je

FOR SALE—Half interest in a three run Water Power Mill. Price, $3,000. Address, mentioning UNITED STATES MILLER. J. M. CASE,
je 296 E. Rich Street, Columbus, Ohio.

FOR SALE—A half interest in a new two run Water Power Grist Mill. This is a rare bargain. When you write state what paper you saw this advertisement in. Address A. J. GLOVER & SON,
je Galien, Berrien Co., Mich.

FOR SALE—Three run Steam Power Mill. Only mill within a radius of ten miles. Mention UNITED STATES MILLER when you write. Address
SMITH, KENOYER & SON, Edina, Knox Co., Mo. je

FOR SALE—A first class mill-site with good dam and good foundation walls of burned mill. Premises include 44 acres land, dwellings, etc. Write for full particulars and mention UNITED STATES MILLER. Address
M. B. BUTLER, Belle Brooke, Green Co., Ohio. je

FOR SALE—A four run Steam Power Mill. Established business. Will give long time or trade for farm property. Address, stating in what paper you saw this advertisement, L. F. HOLBROOK,
je Newell, Buena Vista Co., Mich.

FOR RENT—A three run Custom Mill. Good location. Address, mentioning UNITED STATES MILLER
WILLIAM R. WILKINSON,
je Bois Brule, Perry Co., Mo

FOR SALE—A Two-run Water Mill, new process machinery, etc., all complete for Custom Mill or Merchant Mill. Plenty of water the year round to run night and day. House, stables, etc. Will be sold cheap on easy time. Address E. W. THOMAS,
apr3t Lyons, Iowa.

AT PRIVATE SALE—A first-class Merchant and Custom Mill, recently refitted with modern machinery. Mill has four run of burrs, and is propelled by three Leffel wheels under a 12½ foot head. First-class wheat growing section. Good reasons given for selling. For particulars call on or address HOLT BROS.,
jytf North Lake, Waukesha Co., Wis.

Situations Wanted, etc.

Millers, Engineers, Mechanics, etc., wanting situations, or mill-owners and manufacturers wanting employes, can have their cards inserted under this head for 50 cents per insertion, cash with order.

WANTED—Situation as miller by a single man in a merchant or custom mill. Can furnish references. Satisfaction guaranteed. J. A. ADAMS,
jetf 157 Scribner St., Grand Rapids, Mich.

SITUATION WANTED—By a first class thoroughly practical miller. Have a family. None but those willing to pay a good fair salary need apply. Address
je C. C. ARNOLD, Rubicon, Wis.

WANTED—By a respectable single man, age 33, a situation as miller, 15 years' experience in England and the United States. Is a good stoneman and accountant. Address B. N. A., McGrawville, Cortland Co., N. Y.

SITUATION WANTED.—By a first-class miller of long experience, to take charge of a mill. References, if desired, given on application. Address
MILLER,
Care U. S. MILLER Office,
jy No. 62 Oneida St., Milwaukee, Wis.

SITUATION WANTED—In either merchant or custom mill. I thoroughly understand milling in all branches of the business, and will guarantee satisfaction both in yield and quality when parties adopt my system of bolting. From 43 to 46 pounds of No. 1 flour can be made from 60 pounds of clean wheat. First-class references given. Am not particular as to time needed. Can come at any time. Correspondence solicited. Parties answering please give description of mill, state terms, etc. Address MILLER,
apr Rauch's Gap, Clinton Co., Pa.

IMPORTANT NOTICE TO MILLERS.—The Richmond Mill Works and Richmond Mill Furnishing Works are wholly removed to Indianapolis, Ind., with all the former patterns, tools, and machinery, and those of the firm who formerly built up and established the reputation of this house: therefore, to save delay or miscarriage, all letters intended for this concern should be addressed with care to Nordyke & Marmon Co., Indianapolis, Ind.